

# MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXV.

Published every Thursday at  
39-41 Wade Bldg., by the  
Marine Review Pub. Co.

CLEVELAND, O., JUNE 26, 1902.

Subscription \$3.00 a year.  
Foreign \$4.50 a year.  
Single Copy 10 cents.

No. 26

## LICENSED OFFICERS OF STEAM VESSELS.

Tug men of the great lakes have been on strike almost since the opening of navigation. Differences between the men and the Great Lakes Towing Co. as to hours of labor, Sunday work, etc., admit of argument on both sides and will not be helped by newspaper interference. But the charges against the men filed with the several boards of local inspectors of steam vessels around the lakes involve questions of the highest importance to the shipping interests of the entire country. Officials of the tug company seem determined to settle this legal feature, no matter what the outcome may be as to other differences, and on this score they evidently have the support of the vessel owners. Outside of the service, the position of the vessel owner and the relation of licensed officers to the service seem not to be generally understood. An analysis of all the statutes relating to the merchant marine cannot be undertaken here, but only a brief statement of those bearing closest relation to the immediate question.

The federal power over commerce under the constitution brings within the control of congress "all the instrumentalities by which that commerce may be carried on, and the means by which it may be aided and encouraged;" and it comprehends navigation. Pursuant to this power, vessel property has been surrounded by a great many statutory restrictions unknown to other classes of property, and its employment in the business of commerce and navigation is closely restricted and limited by many regulating statutes, to all of which the owner must give strict, even literal compliance, before he may enjoy use of his property. This regulation and control is reposed in the treasury department, and as to construction, maintenance and manning is administered through the inspection service.

It is provided that every vessel propelled in whole or in part by steam and navigating the waters of the United States, which are highways of commerce or open to general or competitive navigation, are subject to all the laws governing the steamboat inspection service of the United States (excepting only public vessels of the United States). At the head of this service is an inspector general appointed by the president by and with the consent of the senate. There are also ten supervising inspectors similarly appointed and selected for their knowledge, skill and practical experience in the uses of steam for navigation. There are also boards of local inspectors at many important ports, consisting of one inspector of hulls and one inspector of boilers, and in some cases assistant inspectors. These local boards examine the hull, machinery and equipment of steam vessels, and when all the requirements of law have been met issue a certificate entitling the vessel to navigate in accordance with the certificate. In addition to the direct statutory requirements, the secretary of the treasury is given authority to make all such regulations as may be necessary to secure the proper execution of the provisions of law respecting steam vessels.

Not only must all the regulating and restrictive requirements of the law as to construction, equipment and maintenance of the vessel herself be strictly complied with, but after this has been done, an owner is only at liberty to employ the vessel in the business for which she is designed at the hands of specially commissioned persons, known as licensed officers. Their certificates of license are in the nature of commissions for service in the merchant marine of the United States, over which congress exercises close and stringent control. The owner may himself be a navigator of the highest skill or an engineer of unquestioned competency, yet he cannot take command of his vessel or be in charge of her engine, unless he holds this commission or certificate of license from the inspection department. As a part of the regulative restrictions surrounding this class of property, provision is made for licensing masters, mates, pilots and engineers by the local boards of inspectors, and it is only at the hands of these men that an owner may employ his property in the business of commerce and navigation. In addition to the qualifications as to character and competency which the government exacts before the inspectors shall issue a certificate of license, it is required that the applicant shall make oath or affirmation, which is recorded with the certificate, that he will faithfully and honestly, according to his best skill and judgment, without concealment or reservation, perform all the duties required of him by law. The certificate of license which is given after these requirements have been satisfied is not a continuing one, but must be renewed from time to time, and is subject to the power of the inspectors to terminate by suspension or revocation for just cause.

It thus appears that not only is the vessel itself as to its construction, equipment and maintenance and the service in which she may be employed, regulated by the government, but men at whose hands she may be employed are commissioned by the government for the service. The power thus placed in the hands of men holding this certificate of license to impose terms, if so disposed, would be entirely unlimited, and an owner could only employ his property on terms dictated by them if the statutory regulations stopped at this point. It would seem, however, that in recognition of the power so given a limitation has been placed by statute. Section 4449 of the Revised Statutes of the United States designates three distinct conditions, the violation of any one of which calls for revocation of the officer's license under the terms of the statute. It is provided that if any licensed officer shall, to the hindrance of commerce, wrongfully or unreasonably refuse to serve in his official capacity on any steamer as authorized by the terms of his certificate of license; or if any licensed officer shall fail to deliver to the applicant for such service at the time of such refusal, if the same shall be demanded, a good and sufficient reason in writing for such refusal to serve; or if any pilot or engineer shall refuse to admit into the pilot house or engine room any person whom the master or owner may desire to place there for the purpose of learning the profession, in either of these cases the license of the officers must be revoked. The evident purpose of the statute is to prevent the service which is already specialized by the government from being further specialized by licensed officers, and to require them to serve as authorized by the terms of their certificates of license, except for good and sufficient reason in law. It is a condition by which they hold their privilege that they

shall not refuse to exercise it on any steam vessel within the terms of their certificates of license, except on reasonable grounds, and that they may not refuse to permit others to gather in the engine room or pilot house the practical education and experience which will enable them in turn to apply to the local boards for certificates. Having placed the owner of vessel property in a position where he is unable to employ it except at the hands of a privileged class of men, it has taken away from that privileged class the power to dictate unreasonable or wrongful terms under penalty of revocation of their privilege.

The question presented, as we gather it, in the proceedings which have been instituted at various lake ports before the local boards of inspectors is, therefore, whether the men holding this special privilege have either by express agreement or by implied understanding combined together to refuse to serve in their official capacity as authorized by the terms of their certificates of license, and that the effect of this is to hinder commerce. It is not a denial of any right or privilege held by them as citizens, but solely an inquiry as to whether, by the position they have taken, either as individuals or through their association, they have violated one of the conditions subject to which they hold their special privilege; whether their refusal to serve is rightful or wrongful or unreasonable, and whether their oath that they will serve as required by law without concealment or reservation has been violated. If their refusal to serve is unreasonable or wrongful, they have violated one of the conditions and under the terms of the statute their license "shall be revoked."

The tribunals for the determination of this question are the local boards of inspectors. It is not a question for the courts, but is by statute placed with the officers who are authorized to issue the certificates, the power to issue and the power to revoke being reposed in the same men. It has been held by the treasury department that where licensed officers agreed among themselves not to serve in their official capacity in a given class of cases and the basis of their so agreeing was without good and sufficient reason in law, that such agreement must be held to be in effect to the hindrance of commerce, and the officers party thereto, without any further act of misconduct on their part, are subject to revocation of their licenses.

The gist of the whole matter, irrespective of the particular facts or any antecedent circumstances, seems to be whether the demands or circumstances of the refusal to serve are wrongful or unreasonable, and if so, whether they are an actual hindrance to commerce, or of such character as must in reason be held to be in effect to the hindrance of commerce. If so, under the statute the parties thereto have forfeited their right to hold the special privilege. One of the conditions subject to which every licensed officer of steam vessels holds his privilege, is that he will not, to the hindrance of commerce, refuse to perform the services authorized by his certificate, wrongfully or unreasonably. The character of the privilege is manifest; the necessity for limitation is clear. If the privilege were without limitation such as this, the employment of every merchant steam vessel of the United States, in addition to the restrictions placed upon it by the government, would be entirely and completely subject to the will and whim of the licensed men.

## ESTIMATED EARNINGS OF STEEL CORPORATION

A New York dispatch announces that the first quarter of the United States Steel Corporation's second fiscal year, namely, the quarter ending with June 30 next, will be seen to be the most prosperous in the history of the combination. It is estimated that the earnings for the quarter will be \$38,100,000, divided as follows: April, \$11,600,000; May, \$13,500,000; June, \$13,000,000. Some interesting comparisons may be turned on the estimated figures for the first quarter of this year. Assuming that the net earnings will amount to \$38,100,000, they are \$2,417,168 in excess of preferred stock requirements for the entire year since 7 per cent. on the outstanding preferred stock calls for \$35,682,832. Compared again the net earnings for this quarter are \$22,900,000 in excess of the combination's fixed charges, or interest payments for the entire year. These fixed charges amount to \$15,200,000.

## STANDARD OIL NOT INTERESTED IN ROACH SHIP YARD.

The newspapers last week contained an item to the effect that the Standard Oil Co. was the real purchaser of the Roach Ship Yard, Chester, Pa., which has just been reorganized with a capital of \$5,000,000. The Standard Oil Co., writing to the Review, however, says:

"The Standard Oil Co. has no interest in the reorganization of the Roach ship yard; nor has it any intention of having its steamers built there in preference to any other ship yard on the coast."

Testifying before the house of commons committee last week, Lord Brassey, secretary of the admiralty, said that he favored the policy of subsidizing ocean liners for use as armed cruisers. Undoubtedly it would be to the public advantage to have a number of auxiliary war vessels but it could not be accomplished without subsidies. He added that the owners of the Cunard line now remained as the only British champions in the Atlantic traffic and it would be a national disaster if the line were transferred to a foreign flag. If the Cunard line could not hold its own unassisted the government ought, from patriotic motives, render the assistance necessary to retain the company under the British flag.

The navy is short of men and orders have been given to Lieut. J. P. Ryan and a surgeon to make a trip through the strike regions of Pennsylvania for the purpose of inducing striking miners to enlist as landsmen. Should any of these men enlist they will be placed on board special training ships and at the end of a six months' cruise will be transferred to regular vessels of war.



### FOR LIGHTERAGE SERVICE IN THE PHILIPPINES.

A couple of illustrations on this page show how some of the vessels formerly operated by the Cleveland Steel Canal Boat Co. between Cleveland and New York were recently loaded onto the decks of big ocean tramps in New York harbor and taken to the Philippines. It will be remembered that the Cleveland Steel Canal Boat Co. some time ago sold all its vessels (nineteen of them) to the Philippine Transportation & Construction Co., a New Jersey corporation of \$1,000,000 capital, organized to undertake the lightering of vessels in the Philippines, principally in Manila harbor. The crude methods of transferring cargo to and from vessels at Manila and other points in the Philippines has several times been referred to in these columns. It has been explained that the work is done mainly by small boats known as cascoes, which are of only about 15 tons capacity and propelled principally by poles. Mr. Henry F. Lyman of Cleveland, president of the canal boat company, had gained, through

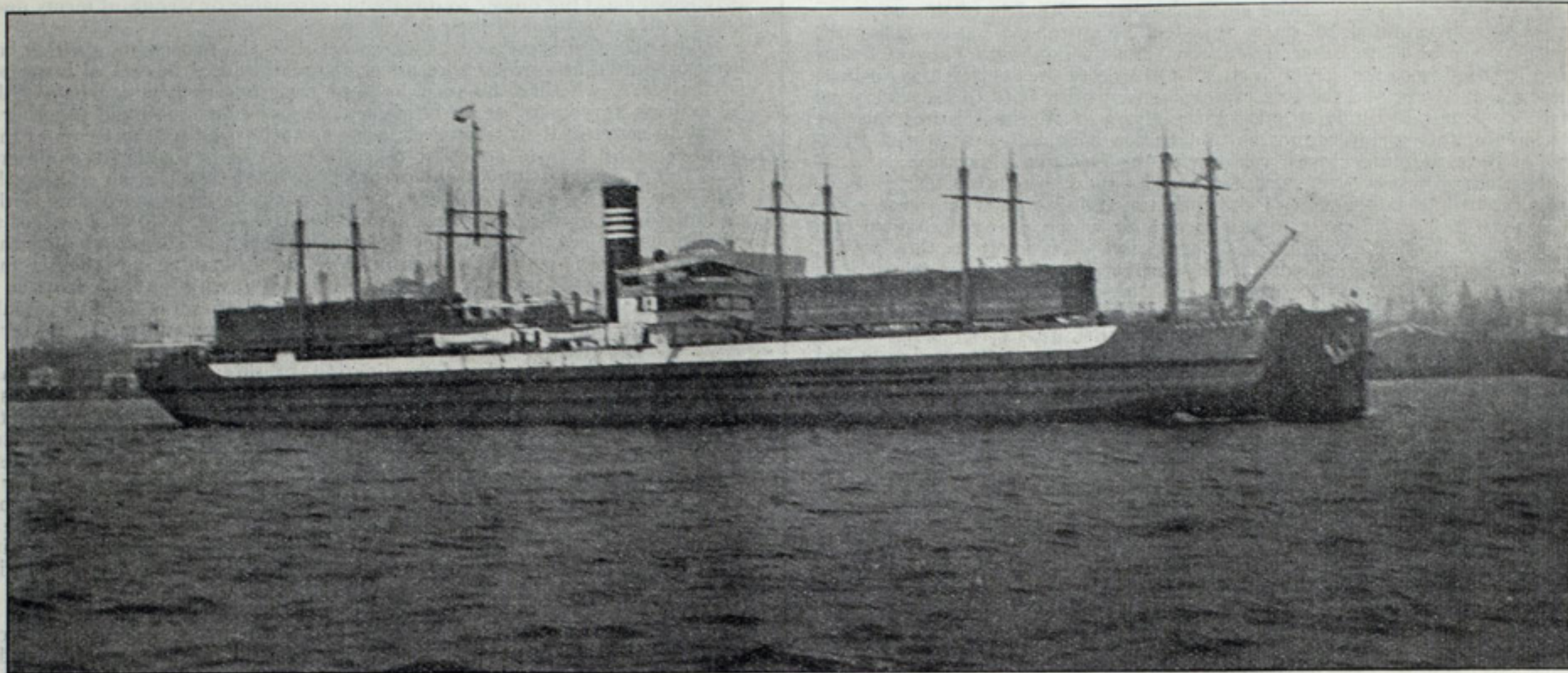
Co. were engaged in putting the barges upon the steamer. The thirteen other canal vessels were cut into sections and stored in the holds of the big ships.

The Melbourne has arrived at Hongkong with her cargo of boats and the turret steamer, the Poplar Branch, is due there shortly. The four steam canal boats will each tow a barge from Hongkong to Manila. The other canal barges will be towed by steam vessels regularly engaged in trade between Hongkong and Manila. Of course the plans of the Philippine Transportation & Construction Co. contemplate business other than the mere operation of the canal boats in the lighterage trade.

### MR. BAKER ON THE MORGAN SHIPPING COMBINE.

Mr. Bernard N. Baker, president of the Atlantic Transport line, in an interview upon the Morgan shipping combination in London, said:

"We are contemplating various steps which will be greatly to the



TURRET STEAMER POPLAR BRANCH WITH TWO STEEL CANAL BOATS ON DECK.

other business associations, a thorough knowledge of the hemp trade in the Philippines. This prompted an investigation of the lighterage conditions, in which Mr. Lyman was joined by Mr. C. E. Wheeler, manager of the canal boat company. Satisfied that modern methods must be applied to the business, a movement to interest capital in New York was undertaken, and the result was the formation of the Philippine Transportation & Construction Co., and the sale to that company of the fleet of steel canal boats—four steamers and fifteen barges—that had been carrying sugar, grain and general merchandise between New York and

public's convenience and economy. Before long the benefits of the combination will become patent to every individual crossing the Atlantic. As to the rival, all-British combine, I can only say that we welcome it. The Atlantic is big enough for us all. If they think they can do better by combining, they would be foolish if they did not. If they intend to depend on increased government subsidies rather than on diminution of expenses and improvement of the service, I think they are mistaken. But I suppose they know what they are about. We are not worrying. Prior to the formation of our combine we had the opportunity of acquiring several more lines than were eventually included, and some of those which were not acquired are now prominently mentioned as factors in the rumored rival combine. However, when the latter materializes into something more than mere suggestions it will be time enough to discuss it. One of the motives attributed by a section of the English press as constituting the necessity for an all-British trust, namely, the likelihood of the Morgan organization putting all its vessels under the American flag, is absurd. We would not do it if we could, and we cannot. There seems to have been quite a little hysteria over here on the subject of our combine, though I am glad to find it is not shared by the leading or thinking people."

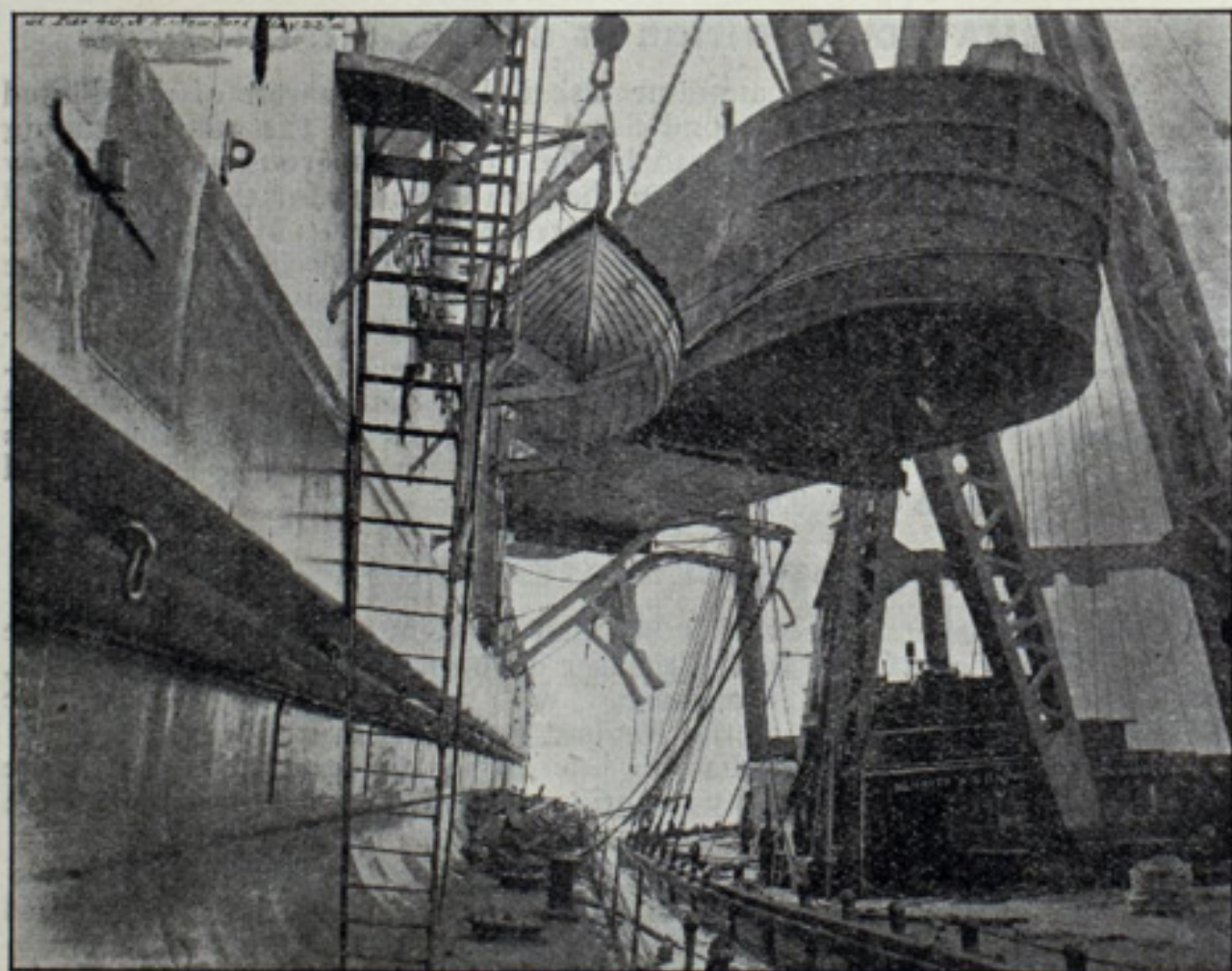
### BRITISH EXPORTS OF RAILS.

Exports of rails from the United Kingdom in May showed a substantial increase, having amounted to 59,961 tons, as compared with 40,695 tons in May, 1901, and 34,586 tons in May, 1900. American competition has accordingly, says Engineering of London, not counted for much, but this is probably due to the fact that American rolling mills are for the present so pressed with orders that they cannot undertake any fresh business. The principal shipments of rails from the United Kingdom in May were:

Country.	May, 1902. Tons.	May, 1901. Tons.	May, 1900. Tons.
Sweden and Norway .....	9,907	6,340	1,455
Mexico .....	14,130	29	95
Argentina .....	6,116	3,158	3,086
British India .....	16,128	21,734	7,466

The aggregate shipments in the five months ending May 31 of this year were 215,590 tons, as compared with 178,667 tons in the corresponding period of 1901. The deliveries of British rails to British South Africa have been rather disappointing this year, but better results may, no doubt, be now anticipated. The Indian demand has been good, and the same may be said of the Argentine; there has also been an inquiry for British rails in Mexico. The value of the rails exported from the United Kingdom to May 31 of this year was £1,209,421, as compared with £1,135,525 in the first five months of 1901, and £954,901 in the first five months of 1900.

At the personal suggestion of President Roosevelt, Lieut. Comd'r Albert Gleaves will be ordered to command the yacht Mayflower, which is to be fitted out for the president's special use. The Mayflower was purchased for the Spanish war for \$450,000. The president will use her in August to observe the operations between the army and navy on Long Island sound.



Hoisting Steel Canal Boat to Deck of Turret Steamer Poplar Branch.

Cleveland by way of the Erie canal and Lake Erie. Mr. Lyman is president of the new company, Mr. Wheeler manager in the Philippines, and Mr. Ira Taylor in charge of the New York office, which is at No. 20 Broad street.

For moving the canal boats to the Philippines two large ocean freighters—the Poplar Branch and the Melbourne—were chartered. Of course, these vessels took out general cargo from New York, but they had to be chartered outright on account of the special conditions attending the transport of the canal boats, which are of 400 to 450 tons capacity each. Four of the canal boats were carried on the deck of the Melbourne and two on the deck of Poplar Branch, which, it will be noted, is one of the turret type of ship. The service of the Merritt & Chapman Wrecking

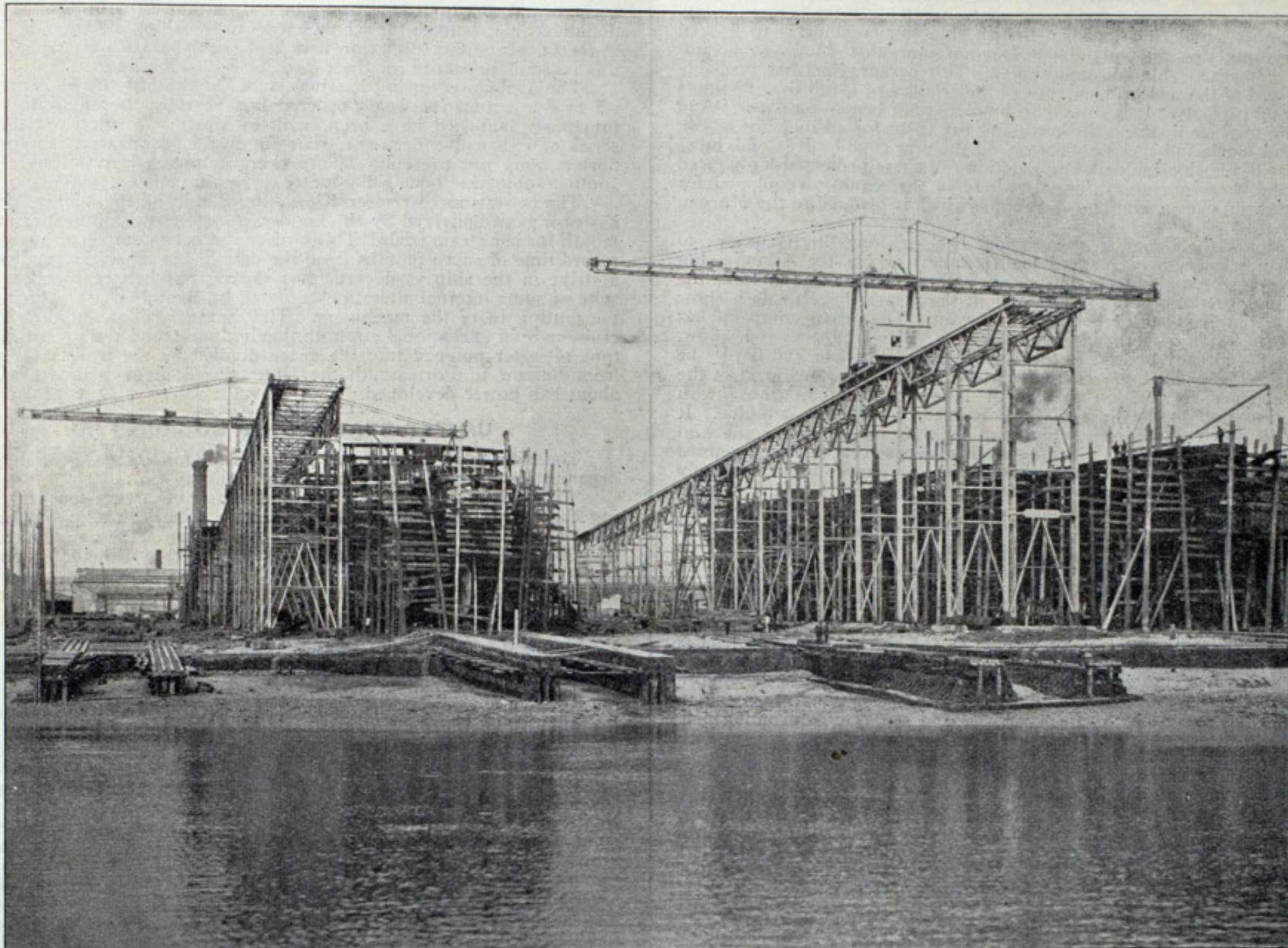


### MAIDEN TRIP OF THE KROONLAND.

The new twin-screw steamship Kroonland of the Red Star line which was built at the works of the William Cramp & Sons' Ship & Engine Building Co. in Philadelphia, arrived in New York city on Saturday last. She will be put into the New York-Antwerp service of the Red Star line immediately, sailing from New York Saturday, June 28, at 12 o'clock noon. The Kroonland is the third of the quartette of new twin-screw steamships which the International Navigation Co. has built for the New York-Antwerp service of the Red Star line. She is the largest ship ever built in the United States and is a sister ship of the Vaderland which was launched on July 12, 1900, at the works of Messrs. John Brown & Co., Ltd., of Clydebank, Glasgow, and the Zeeland which was launched at the same yards Nov. 4, 1900. In a general way the Kroonland is built on the

and about 1,000 third-class. The arrangements for loading and discharging cargo are very complete.

The engines are of quadruple-expansion, direct-acting and surface-condensing type. The four cylinders each work a separate crank, and are so arranged as to produce a minimum of vibration, the parts being so disposed as to be practically balanced without the use of counter-weights on crank arms. There are eight single-ended boilers in the ship, constructed of steel and adapted for a working pressure of 200 lbs. per square inch, four furnaces to each boiler, making thirty-two in all. These boilers are in two compartments, leading into two funnels, which are 98 ft. high from the grate level, and elliptical in plan, 13 ft. 6 in. by 8 ft. 6 in. The fans are eight in number and 7 ft. 6 in. in diameter, and are situated directly under the funnels. If the vessel should be needed for service in the time of war the disposition of the bunkers would give coal protection to



Two electric battleship cranes and trestles at ship yard of Vickers, Sons & Maxim, Ltd., Barrow-in-Furness, England. The first trestle is 715 ft. long and of 30,000 lbs. 60 ft. from center and 10,000 lbs. 95 ft. from center.

The second 633 ft. The trolley travels 190 ft. with a maximum load. Built by the Brown Hoisting Machinery Co., Cleveland.

same plan as the Vaderland, but in the matter of appointments and various conveniences it is even an improvement over the latter. The Kroonland is 580 ft. long, which is 26 ft. longer than the St. Louis and St. Paul, and has a register of 12,000 tons, or 400 tons more than the St. Louis and St. Paul. She possesses every device for the safety and comfort of passengers and carries the largest improved appliances for the protection of life. Except in the one point of speed the Kroonland is the equal of the finest steamships afloat and will enable persons of moderate means to enjoy all the luxuries of the fastest ocean greyhounds.

Passengers are carried on three decks—the promenade, the upper, and the saloon deck—and among the numerous distinct advantages offered is the location amidship of all first and second-cabin saloons and staterooms, a point where motion is at a minimum. For lighting and ventilation, in addition to the numerous sidelights, there is an unusually large trunk well extending through two tiers of decks tastefully decorated in white and lighted through a richly ornamented glass roof. The seats are covered with rose-colored moquette and the upholstery throughout is in excellent keeping with the color scheme of the other decorative material. All the rooms are unusually large, excellently lighted and ventilated by the same system which has won so many words of praise from patrons of the St. Louis and the St. Paul. In cold weather the fresh air is heated by passing over steam pipes and the heat thus supplied may be regulated for each deck independently. By this superior system the inner rooms are made as comfortable as the outer ones. The interior rooms, which in many vessels are sometimes so dark as to require artificial light, are in these lighted from over head by oval glasses, sufficiently large to give ample light. For extra illumination electric lights are provided. All of these rooms are finished in mahogany. Everything possible has been done to make the music room and library attractive. The smoking room for first-class passengers is panelled in fumed American oak and has all of the latest appointments and conveniences. The description of the first cabin staterooms will very nearly serve for the second cabin, the fittings being almost identical. The steerage quarters are commodious and well ventilated. There are berths for 343 first-class passengers, 194 second-class

the boilers, while safety from breakdowns is assured by the adoption of twin-screws, which are fitted with enclosed shaftings, and brought close together by the adoption of a small aperture in the stern frame.

The Finland, the fourth of this quartette of twin-screw steamers of the International Navigation Co., was launched at the Cramp works in Philadelphia the same day that the Kroonland sailed for New York. The Finland is practically a duplicate of the other three vessels and will also be put into the New York-Antwerp service of the Red Star line.

### PROMOTIONS IN THE NAVY.

Secretary Moody has prepared the following memorandum in regard to promotions in the navy:

"In the future when an officer is promoted the bureau of navigation will forward to the secretary of the navy a record of the officer's service since last promoted, special duty performed, the length of time in grade, length of time on sea service, and the percentage of the time at sea, all this since last promotion."

This action of Secretary Moody is taken in order to provide him, and through him the president, with information concerning officers who come up for promotion, which the records of examining boards do not disclose. The papers of an examining board show only his physical, mental, moral, and professional qualifications. In the past, after an officer has been passed by an examining board, the approval of the secretary and the president has been a purely routine matter. In the future if an officer's work since last promotion does not, in the opinion of the president, fit him for the duty to which he is slated to succeed, the executive approval will be withheld.

Another submarine boat, the last of the flotilla of five built by Vickers, Sons & Maxim, Ltd., was launched at Barrow lately. No. 1 has been put through deep sea trials under the supervision of Capt. Bacon, to whom the admiralty have allotted this special duty. So far the submarines have given the greatest satisfaction. A large special submarine boat 100 ft. long is being built at Barrow, but is not yet ready for launching.



### SHIPPING PROSPECTS AND SHIPPING SUBSIDIES.

Glasgow, June 13.—A new shipping combine has been formed—in the columns of the London evening newspapers. It has a capital of £10,000,000 and is going to build six 25-knot boats at £1,200,000 each, and twelve 16-knot boats at £110,000 each. With these it is going to lick creation on both the Atlantic and Pacific, and to monopolize the passenger and cargo traffic of both oceans by weekly or semi-weekly runs between Milford and Montreal, and between Vancouver and the far east. The boats are to be as heavily armed as third-class cruisers. They are to be subsidized by two or three, or half a dozen states of the British empire. And the combine is to be a sort of syndicate composed of the British government, the Canadian government, Lord Strathcona, Sir Christopher Furness and a few others. It will knock the Morgan corporation into a cocked hat, and the Cunard, Allan and Elder-Dempster lines into liquidation—unless the bosses of these lines make a virtue of necessity and join the happy throng. In short this wonderful Canadian-British shipping combine is to be and do everything that anybody but a London journalist knows to be improbable, impracticable and undesirable. This paragraphist has probably never heard of the fuel problem, nor of the relation of speed over 20 knots to carrying capacity. It is so easy to build 25-knot boats—on paper. And so simple to place them on the berth and run them for all they are worth, chock and block, full speed both ways, all the year round. It is odd, however, that Clyde ship builders know nothing of these projected high-speed boats—and there are no yards elsewhere in the country equipped for building them, except Harland & Wolff's, which is pledged to the Morgan combine.

No doubt the Canadian government has for long been anxious to establish a service of high-speed mail steamers across the Atlantic, but they have not been able to tempt anyone with the means to undertake the work. Two or three bold spirits, without the means, have made a show of trying, but have failed before they began. The Allan company has declined the offer with thanks, and what the Allan line does not know, and does not already possess of the British-Canadian trade, can hardly be worth knowing or having. There are projects for the readjustment of the several steamer services on the North Atlantic, including those with Canada, but not on the lines of the imaginary Strathcona combine. It is a pity so much should be written upon shipping matters by people who know nothing about them. The amount of nonsense that has been penned and published since the announcement of the Morgan combine is simply appalling. No doubt the readers of the Marine Review take it at its true worth.

Ship builders here are more interested in the project to establish steel ship building on an extensive scale in Canada. The scheme with which Messrs. C. S. Swan & Hunter of Newcastle-on-Tyne are concerned seems to have in it the elements of success, though with all the defects inseparable from state-aided industries. With her natural advantages Canada ought without subsidies to become the cheapest steel producer and (next to Great Britain) the largest ship builder in the world. This prospect is very important from an imperial point of view, but the British Empire League does not seem to have caught it yet, and the Navy League is more concerned about cruisers than commerce in discussing maritime affairs. They have just manifested as follows: "If, as we are credibly informed, it is open to the British government to secure by friendly agreement with the North Atlantic trust that there shall be no transfer of British ships, either those now entering the combine, or those to be built for it in British yards, to any foreign register, and likewise to contract that they shall continue to be officered and manned by the Royal Naval Reserve, our national interests would be safeguarded, and the Navy League's objects attained. If the government have reasonable proposals of this character before them, we trust that they may be accepted, as such an arrangement could not fail to strengthen our maritime position in the event of war with any other country than the United States. In any event the league appeals to the government to make the present the occasion for a new departure in our mercantile policy, recognizing the necessity of linking up the different parts of the empire by a subsidized line of steamers suitable for admiralty purposes." By subsidies, it should be noted that the Navy League means something like what in law practice is known as "retaining fees" and "refreshers"—payments to have the right of call on properly equipped merchant steamers for naval purposes and annual payments to make it worth while for the owners to keep their vessels up to the necessary mark of efficiency. The idea of subsidizing merchant shipping for any other purposes than this and for mail services is scouted by British ship owners as a class and would never commend itself to the British nation. For one thing, ship owners know that subsidies imply state interference and they have more than enough of that already. All that British shipping needs is to get rid of the restrictive shipping laws and blighting influence of officialism. And if the Morgan combine has led the way to that, it will have been the greatest blessing to Britain as a maritime nation.

The note of reform has already been sounded and the prophetic one can foresee the change that is inevitable if we are to retain our maritime supremacy. We can build ships more cheaply than any other nation, and we can certainly sail them more cheaply, if only our own government will allow us. In a word our maritime industry in future must be governed by considerations of trade, not of the board of trade. Let me add here that ship owners generally by no means approve of the evidence recently given by Sir Robert Griffin before the select committee of the house of commons on steamship subsidies. They do not accept his views as to running vessels at a loss at the government expense in order to crush foreign competition and they do not want the coasting and colonial trade of Britain reserved for British ships. They want fair, open and free competition, with no government aid anywhere, and they want just the same access to foreign coasting and colonial trades as we afford to foreign vessels. British shipping has grown up without subsidies and can manage to live and thrive without them.

It would be interesting and instructive if someone would figure out how far the depression of the freight markets is due to the large sales within the last three years of British second-hand ships to foreigners. It is certain that quite a fleet of these denationalized vessels have run down the rates on North sea and Mediterranean traffic to a losing point for British ships. This is especially true in the Spanish ore and fruit trades, nearly all of which is now conducted in British-built vessels under foreign

ownership. The outlook for ship owners is not good. A large amount of tonnage engaged by the government for the South African war will now be released and will soon be competing for employment. There is an excessive over-supply of ocean tonnage in the world just now, and unless more vessels are laid up until the conditions improve, freights must go even lower than they are. There is now happily little doing in the construction of new cargo vessels.

The lines, however, have to go on building, however slack may be the current of trade and however low freights may fall. This week the Peninsular & Oriental Co. has made another addition—the Sardinia—to their extensive fleet in the Indian and Australian mail and passenger service. This boat was built by Barclay, Curle & Co., Ltd., and is 466 ft. long by 52 ft. 3 in. broad and 33 ft. 6 in. molded depth. She will have triple-expansion engines with cylinders 22½ in., 37½ in. and 48 in. diameter respectively and a stroke of 48 in. There are three complete laid decks, a poop, bridge and forecabin, and a boat deck above the bridge. There is a double cellular bottom the whole length of the ship, and there is the usual P. & O. accommodation for first and second-class passengers, though this vessel is primarily for the cargo service of the line.

The Vickers company has just launched the last of the experimental set of five submarine boats ordered last year by the admiralty. Those previously launched have been, with satisfactory results, put through a series of exhaustive deep-sea trials—at which, of course, newspaper reporters were not present. The Vickers company is now busy building another submarine boat, a 100-footer of an altogether new type.

The new armored cruiser King Alfred, built by the Vickers company, has now been delivered by the builders to the naval authorities at Portsmouth for her steam trials. This cruiser has been completed for sea in the record time of seven months from the date of her launch, notwithstanding a strike of the ship yard carpenters during one-half of the time and in spite of some internal alterations ordered by the admiralty, which delayed the putting in of the machinery. The engine room bulkheads in this cruiser are of exceptional strength, having withstood the pressure of 1,000 tons of water pumped into the space divided by the walls. On the run from Barrow to Portsmouth the King Alfred made 18 knots with only about half power developed.

### UNITED STATES SHIP BUILDING CO.

The New York Commercial publishes the following editorial upon the organization of the United States Ship Building Co.:

"In marked contrast with the conditions and circumstances surrounding the attempted consolidation of certain American ship building concerns a year ago, subscriptions to the bond issue of the new United States Ship Building Co. opened yesterday and to be closed this afternoon, were traded in on the curb as early as last Monday, and one block was sold at 105, the underwriters' offer being 97½. It is more than likely that the entire issue of \$9,000,000 'fives' will be oversubscribed many times—and such an immediate result of the consolidation would be the most conclusive proof that the conservative American investing public has still an abundance of faith in the future of large industrial enterprises under intelligent and honest management. Discussing at length the importance of the personal equation in the management of these industrial combinations, the Wall Street Journal called attention the other morning to the fact that managers and executive officials of industrial companies have in very many instances 'permitted themselves to become identified with enterprises totally distinct and separate from those whose interests they are employed to watch over.' And all close observers of such matters will agree with it that instances of this sort have been sufficiently frequent since these consolidations first began to justify the adverse comment that has been aroused. And they will likewise give prompt indorsement to these further opinions: 'We think that one of the things that stockholders should exact from those who manage their affairs, more especially in the case of industrial companies, is a concentration of time and thought upon the affairs of that company to the exclusion of other enterprises. It is much better to pay a man \$20,000 a year for all his time than \$10,000 a year for half his time; and one man at \$20,000 a year, giving all his thought to the affairs of the company, is much more efficient than two men at \$10,000 with divided interests. Experience shows that the loss of efficiency by division of interest is in geometrical ratio to that division.'

"It is worth noting right here that in the case of the United States Ship Building Co., while the direct conduct of its affairs will doubtless be left as at present in the hands of the managements of the constituent companies, the personnel of the directorate embraces the heads of these companies almost exclusively; the two exceptions are the attorney and an officer of the underwriting trust company; and the general counsel of the Bethlehem Steel Co. will also go into the general board of the combination as the representative of that newly-acquired property. Briefly, it was not found necessary to go outside of the promoting ranks in order to give financial strength to the new directorate or to take in men merely for the sake of their influence or 'the looks of the thing.' Where that is necessary, it generally carries with it obligations that prove embarrassing later on; and in some instances indifferent industrial management can be traced clearly to the enforced employment of inefficient executives or sub-executives through that influence. In its initial organization the United States Ship Building Co. appears to be conspicuously free from any personal entanglements that might subject it to the sort of criticism noted by the Journal."

Comdr Wainwright, superintendent of the naval academy, is to be assigned to command the battleship Alabama next October. The Alabama is a pretty big ship for a commander and the assignment to a vessel of her class of an officer lower than the rank of captain is unprecedented. The decision to give Comdr Wainwright this important command is attributed to President Roosevelt's admiration for Wainwright's record as a fighter in the battle of Santiago where he served on the yacht Gloucester, a converted yacht that engaged the Spanish torpedo boat destroyers Furor and Pluton at close quarters.

Mr. Spencer Miller, engineer of the cableway department of the Lidgerwood Mfg. Co., New York city, sailed June 17 on the Patricia for Europe, to confer with naval officials regarding the equipment of several battleships with the marine cableway. Mr. Miller will visit London, Paris, Berlin, St. Petersburg and possibly other capitals before his return.



## ORDERING LAKE FREIGHTERS FOR 1903.

Orders for six steel freighters of the 5,000 to 6,000-ton kind, to come out in 1903, have been announced from the Cleveland office of the American Ship Building Co. within the past few days, and it is understood that there are still four more steamers (Canadian canal size) under contract, but about which no information has been given out as yet by the builders. These four smaller steamers are for the Wolvin syndicate that is to develop a special trade in grain, package freight, etc., down the St. Lawrence to Quebec. Of the six large steam freighters ordered within the past few days five are for interests represented by Capt. W. W. Brown of Cleveland and one is for the Messrs. Hawgood, also of Cleveland. Both Capt. Brown and the Messrs. Hawgood placed orders early last year with the ship building combination for large vessels, and they are now augmenting their fleets, notwithstanding the hesitancy of other vessel owners in this regard on account of the enormous increase in vessel capacity on the lakes within the past few years. In placing orders now they are evidently prompted by conditions regarding the supply of material for new ships. No matter what effect freight conditions for the balance of the present year may have upon the business of another season, it is more than probable that as far as prices are concerned there is nothing to be gained for some time to come by delaying orders for new vessels, as manufacturers of shapes and plates are so crowded with work that there is even doubt now of getting material at any price for ships to be delivered next spring. These orders certainly give the ship building combination a very good start on another year's business. With only a few more contracts they will have new work enough to insure, with the regular run of repairs, employment for most of their plants until the spring of 1903. The United States Transportation Co., a corporation in which L. C. Smith of Smith-Premier typewriter fame and other Syracuse (N. Y.) capitalists are interested, is the organization which Capt. Brown represents in placing the order for five freighters. These same interests ordered five steamers a year ago and Capt. Brown is now managing them, together with three or four smaller vessels. Capacity of the five new steamers will range from 5,000 to 6,200 tons. The largest will be 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep. Three of them will be 400 ft. over all, 380 ft. keel, 50 ft. beam and 28 ft. deep. The smallest will be 390 ft. over all, 370 ft. keel, 48 ft. beam and 28 ft. deep. They will all have triple-expansion engines and Scotch boilers, and the boilers in all cases will be fitted with Ellis & Eaves induced draft. The vessels will be built at the Lorain and South Chicago yards, and are to be completed April 15, 1903. The Hawgood vessel will be a duplicate of the steamers Etruria and Bransford of the Hawgood fleet which came out this season. She will be 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep. She will have triple-expansion engines and Scotch boilers. This steamer will also be ready for service by the opening of navigation next spring.

The Craig Ship Building Co. of Toledo is also assured of new work running into next spring. Arrangements were made a short time ago with Thomas Adams of the Adams Transportation Co., Detroit, for the construction of a duplicate of the large freight steamer Thomas Adams, now nearing completion at the Toledo works, the new vessel to be delivered early next spring. The builders will be part owners of this vessel. The Thomas Adams, now about completed at Toledo, has a length of 356 ft., 50 ft. beam, and a molded depth of 28 ft., her carrying capacity being placed at about 5,000 tons. Capt. Nicholson and Engineer Watts, formerly in the old Tom Adams, now the Langham, will take out the new boat.

Officials of the Detroit & Cleveland Navigation Co. are considering the advisability of adding another side-wheeler or two to their fleet of big passenger and freight steamers. If they are to have even one new steamer for next spring they must take action at once. It is the general opinion that they will order either one or two new vessels but that they will not be completed until the spring of 1904. Of course the new steamers will be built at the works of the Detroit Ship Building Co., where all the Detroit & Cleveland line boats have been built, and they will undoubtedly be of the largest and finest kind.

The steamer Tuscarora, which struck 2½ miles off shore and about 5 miles south of Manitowoc a few days ago, was docked for survey at the Shipowners' Dry Dock Co., Chicago, on Tuesday. The survey showed that it will be necessary to renew thirty-two plates on the port side, ten keel plates, six plates on the starboard side and 125 floors and frames. It is estimated that she will be in dry dock three weeks.

The Johnson-Knudson Co., ship carpenters and contractors of 34 Robert street, Chicago, have been steadily increasing their facilities until they have quite a large business in repairs to wooden vessels. Vessel men express satisfaction with their work. They have a branch office at 288-290 So. Water street.

Steamer Wilkesbarre, which stranded at Caribou island, will be in dock at Buffalo for a couple of weeks. Fifty plates have been taken off and all her floors for 20 ft. back from the bow must be replaced. She is also twisted aft and a large section of fender strake is being put on.

Another quarterly dividend of 1¾ per cent. on the preferred stock of the American Ship Building Co. has just been declared. It is payable July 15. Stock transfer books close July 5 and will be reopened July 16.

## EXPORTS OF IRON AND STEEL.

The exportation of manufactures during the eleven months ending with May, 1902, is greater than that of any preceding year, except in iron and steel. The total exports of manufactures for the eleven months ending with May amount to \$371,647,609, against \$378,533,496 in the eleven months of 1901, or only \$6,885,887 less than those of last year. The exports of iron and steel manufactures for the eleven months are \$90,780,571, against \$109,483,827 in the corresponding months of last year, a reduction of \$18,703,256. From this it would appear that the exports of manufactures other than iron and steel are \$11,817,369 greater than in the corresponding months of the preceding year. The exports of manufactures other than iron and steel are, for the eleven months ending with May, 1902, \$280,867,038. For the eleven months ending with May, 1901, they were \$269,049,669. For the eleven months ending with May, 1900, they were \$283,050,704, but when it is remembered that these figures included

the exports to Porto Rico and Hawaii, which are not included in those of 1901 and 1902, it becomes apparent that the exports of manufactures other than iron and steel in the eleven months of the present fiscal year are greater than those for the same period in any preceding year in this history of our commerce.

While the exports of iron and steel have been decreasing, importations of iron and steel have been increasing. The following table shows the imports and exports of iron and steel manufactures in eleven months of each of the fiscal years 1900, 1901 and 1902:

Eleven months.	Imports iron and steel.	Exports iron and steel.
1900 .....	\$18,689,857	\$110,038,875
1901 .....	16,408,996	109,483,827
1902 .....	23,544,325	90,780,571

From this it will be seen that the importations of iron and steel manufactures have materially increased during the three years, and the exportations of iron and steel materially decreased. The cause of this change in the condition of the foreign commerce in iron and steel is discussed in the report of the Iron and Steel Association, just received by the treasury bureau of statistics, as follows:

"A marked change has taken place in our foreign trade in iron and steel since this subject was prominently referred to in our annual reports in 1899 and 1900. In 1899 and immediately preceding years the iron and steel industries of Europe were exceptionally prosperous; there was an active demand and prices were high. In the years just prior to 1899 the prices of iron and steel in the United States were lower than they had ever been. Under these conditions we naturally found opportunities to dispose of our surplus iron and steel products in neutral markets and even in the home markets of our European competitors. But these conditions have materially changed; the European demand and European prices have declined and the home demand upon our own iron and steel works has greatly increased while our prices have advanced; hence sharper competition in neutral and all foreign markets and increased foreign competition in our own markets. The figures of increased imports and decreased exports of iron and steel should not be hastily dismissed by our iron and steel manufacturers. We hope that they will lead them instead to dismiss the thought that the world's markets for iron and steel are to be easily captured and held. The activity in our export trade in iron and steel in the last few years was exceptional and abnormal. Not only is Europe adopting our improved methods of manufacture but it will always have cheap labor, and by these agencies it can hold its own markets and actively and aggressively contend for the possession of neutral markets. For our iron and steel industries, as well as for all other domestic manufacturing industries, our home market must always be our best market."

The following table shows the exports by principal classes during the eleven months ending with May, 1901 and 1902, respectively:

Products of—	1901.	1902.
Agriculture .....	\$884,424,916	\$805,622,656
Manufactures .....	378,533,496	371,647,609
Mining .....	35,626,488	36,190,756
Forests .....	49,472,249	43,339,726
Fisheries .....	7,454,347	7,440,629
Miscellaneous .....	4,447,939	5,069,192
Total domestic .....	\$1,359,959,435	\$1,269,310,568
Foreign exports .....	25,031,293	23,467,850
Total exports .....	\$1,384,990,728	\$1,292,778,418

## ANOTHER VIEW OF MR. MORGAN.

English technical journals are determined not to let Mr. Morgan alone since he has invested in shipping property. The Engineer of London has this to say of him now:

"It will be remembered that, in writing about the Atlantic shipping trust, we have repeatedly said that it is not with the United States, but with Mr. Morgan, that we have to take count. We have explained that his action is in no way localized by patriotism; and that it is an important accident that he is an American citizen. A remarkable confirmation of the soundness of our views is afforded by the utterances of a well-known American juriconsult, reported by the Vienna correspondent of the Times. This gentleman holds, as we do, that it is Mr. Morgan, and not the United States, with whom the rest of the world has to do. He goes on to say that whatever apprehension may be aroused by the rapacity of these trusts or a consideration of the effects of their extension to Europe, is but a trifling circumstance compared to the feeling on the subject in the United States itself. This adverse sentiment springs from a perception of the fact that such men as Mr. Morgan may involve the country in foreign complication of serious import. For a time delight may be taken in the apparent expansion of American commerce and American influence; but it will soon be found that for these things the syndicates care nothing, and they would have no more compunction in injuring the United States than they would have in injuring Great Britain or Germany, so long as they made money. The American lawyer goes on: 'For a short time the public in the United States may be deceived by the fact that such movements are labelled American, and that the entire country is credited with the increased power and influence which in truth belongs only to a few individuals. But eventually they will forcibly realize that there is a point beyond which individual power and influence cannot be permitted to take root in a republic.' He is confident that the great body of American citizens would resent to the utmost any action taken by their own government which would tend to estrange friendly nations in order to aggrandize the 'overloaded coffers of the trust magnate.' Whether he is or is not right in assuming so much it is not for us to decide; no doubt he understands his countrymen better than we do. This is not the point, however. It is that a high authority endorses our arguments, and is quite as insistent as we have been that it is Mr. Morgan and not the United States against the world."

The Cleveland Pneumatic Tool Co. of Cleveland has purchased a tract of land on Hawthorne and Second avenues and will at once begin the erection of modern factory-buildings. They will employ about 150 men in the new works.



**COLLIER AUGUST BELMONT.**

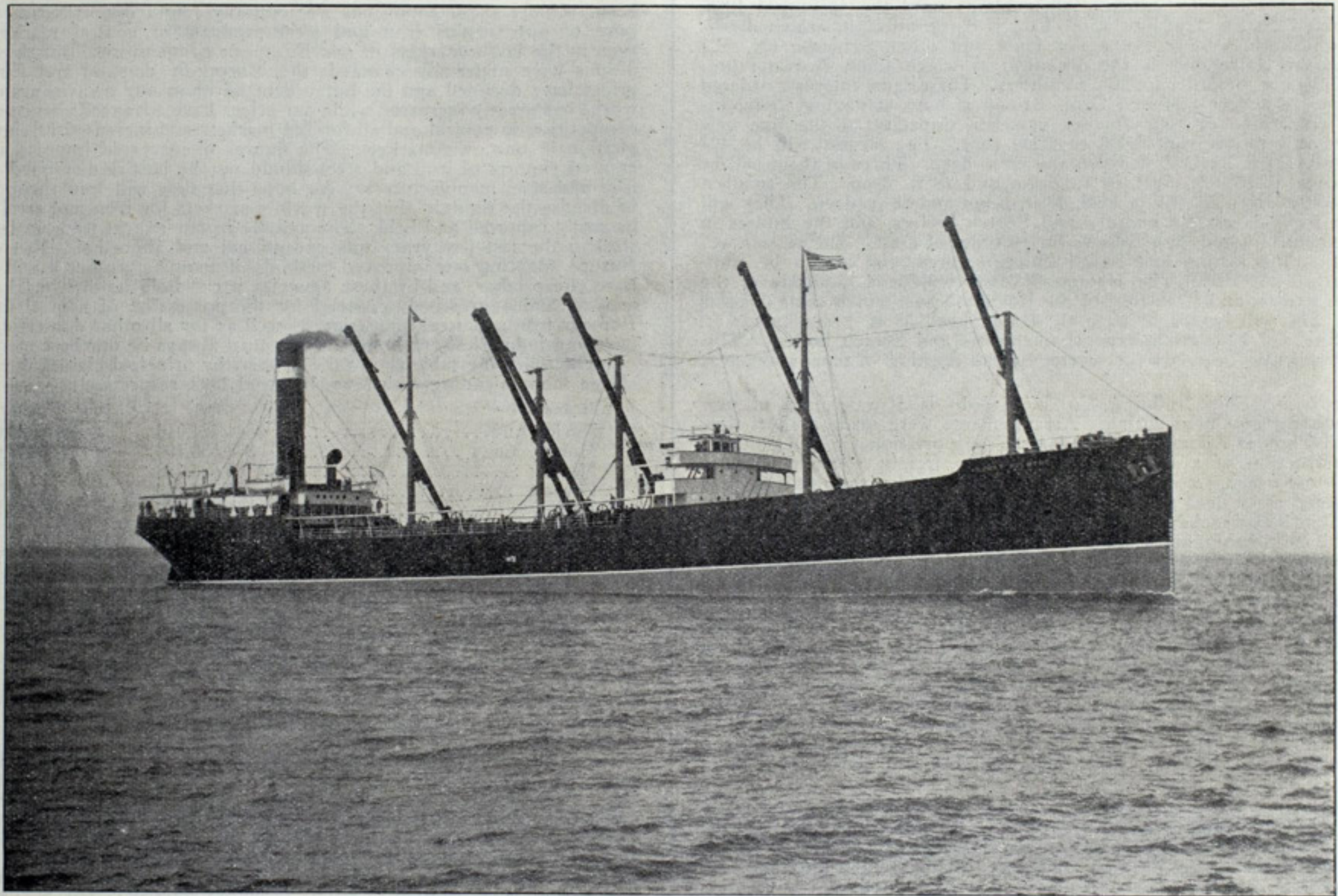
A strange looking craft indeed is the August Belmont, which has just been built by C. S. Swan & Hunter, Wallsend-on-Tyne, England, for the Louisville & Nashville Railroad Co. She is intended to run with coal between Pensacola and Tampico. She is a collier of the largest and most improved type. She is equipped with a patent discharging gear which will permit of the discharge of a full cargo in about eleven hours. It is this discharging gear which constitutes the chief specialty of the ship and which is responsible for her peculiar appearance above deck. Her spacious holds are fitted with eight large hatchways, and these are served by five powerful derricks, in the nature of stump masts, to which the patent discharging gear, known as the Dodge discharging gear, constructed by the McMyler Manufacturing Co., Cleveland, is attached. The object of this gear is to discharge coal at the utmost rapidity by means of grabs. The gear discharges from one side of the vessel only. It consists of a transporter for each hatchway, the keel of which has a swivel deck plate, which is held in position by a track riveted to the deck, composed of angle irons and extending almost the whole length of the vessel abreast of the hatchways. The heel of the transporter can be moved in a fore-and-aft direction by suitable ropes worked off the steam winch ends. The head of the transporter is supported by spans between the masts, so that it can be slewed or elevated as required. On the transporter runs a trolley wagon which is hauled out by a wire rope, which also suspends the grab and is connected to a large-sized winch drum. The trolley wagon runs down the transporter by gravi-

the rope is hauled taut, which opens the grab, allowing the coal to fall into the truck, but if the coal is required to be lowered into say a lighter and without unnecessary breakage, then the trolley wagon is hauled out still further, until it is caught and detained by the lever, when the grab can be lowered from the trolley wagon after the trolley is held in position, and when lowered the grab can be opened at any distance and the coal discharged into the lighter. The whole operation therefore requires at least two runners and if the grab and coal have to be lowered into a lighter then three ropes are required. Each of the gears are to discharge 100 tons of run-of-mine coal per hour, so long as there is 2 ft. of coal under the grab.

There are six of these transporters working eight hatchways. The weight of this gear, beyond that of an ordinary ship's gear, is estimated at 90 tons, including the necessary ship work, such as winch beds, track, etc. The weight of coal the vessel will carry is estimated at 6,080 tons which it is intended to discharge in about eleven hours. Mr. T. J. McMyler, under whose supervision the discharging gear was fitted, witnessed the trial test of the steamer.

**BRIDGING THE STRAIT OF CANSO.**

A dispatch from Sydney announces that the bridging of the Strait of Canso between Cape Breton and the mainland of Nova Scotia will be undertaken at once. The task is an immense one, involving great engineering difficulties and an outlay of about \$5,000,000. J. A. L. Waddell of Kansas City has been engaged to oversee the work. He is a Canadian,

**COLLIER AUGUST BELMONT.**

Built by C. S. Swan & Hunter, Ltd., Wallsend-on-Tyne, England, for the Louisville & Nashville Railroad Co.

tation. There is also a similar rope from another winch barrel, which also passes over the end of the transporter, and then is connected to the opening and closing gear of the grab. There is a third rope which is connected to a lever which temporarily fixes the trolley wagon at any required height. The latter line is worked by a lever operated upon by the foot of the winchman. The other two lines are, as before stated, led to two independent drums on the main shaft of the steam winch, and each of these barrels are worked by independent clutch gear. The winch always goes in one direction. The hauling on the transporter of the trolley wagon with its grab and load is performed by the winch; the lowering of same down the transporter is by gravitation alone. The winch is direct-acting, having cylinders 12x16 in., and is worked by levers placed by the side of the hatch. It has about 40 I.H.P. In addition to the before mentioned drums there are two winch ends mounted on an intermediate shaft. These are required for general purposes, such as the slewing and elevating of the transporters, etc.

The method of operation is this: Let us presume that the carriage and grab are at their lowest point, say at about the center of the hatch, the carriage being stopped in this position by an adjustable stop secured to the transporter at the required position. The winchman then disengages the drum, which allows the grab to fall by gravitation into the hold with its mouth open. The second line is then hauled taut and closes the grab. The other line, together with the grab line, is now hauled taut by the winch, which hoists the grab and its load, until it comes up to the trolley wagon, when the trolley wagon and its load is hauled up the transporter to the required distance or height. If it is required to discharge the coal into a truck at a comparatively short distance below the grab,

and has been knighted by the emperor of Japan. He was one time professor of civil engineering in the University of Japan. Mr. Waddell says that the bridge will be a cantilever, with a span of 1,800 ft., the longest in the world, and will have a height of 58 ft. clear above high water. The bridge will span the strait between Port Hastings on the Cape Breton side and Cape Porcupine on the Nova Scotian shore, a distance of 2,800 ft. Two immense piers will be sunk near either shore in about 90 ft. of water. The bridge is designed for double tracking. Mr. Waddell says that it will be the finest bridge in the world. A tunnel, he said, would be practically impossible. An agreement has been reached between Mr. Waddell and the incorporators, authorizing Mr. Waddell to proceed with the work. The construction of this bridge will remove all delays and inconveniences now experienced in crossing this strait.

In a recent report on the foreign trade of Japan it is stated that for a number of gunboats for service in the Philippines, on account of which the United States government recently asked for tenders, four Japanese ship building companies competed. The Uraga dock yard, being the second lowest tenderer, succeeded in obtaining an order for five small composite gunboats. They are to cost about \$30,000 each. Another and larger order was placed with a Shanghai firm of ship builders.

The new Hamburg-American liner Blucher, sister ship of the Moltke, has reached New York on her maiden trip. She was built by Blohm & Voss of Hamburg and is 525 ft. long, 62 ft. beam and 45 ft. deep. She is designed for a moderate speed.



### TEST OF BERMUDA FLOATING DOCK.

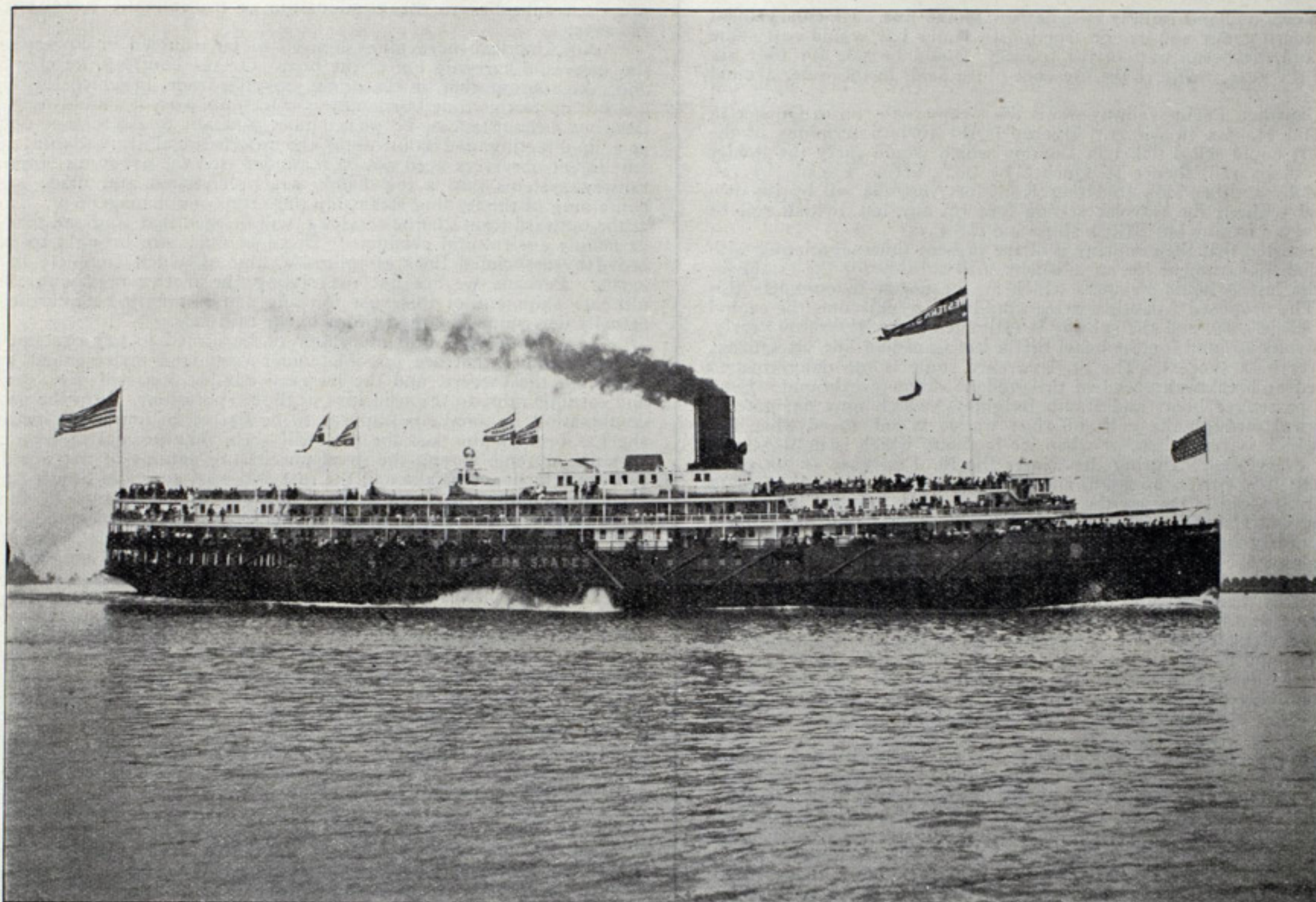
The Bermuda floating dock, constructed by Messrs. Swan & Hunter, Wallsend-on-Tyne, for the British admiralty, was successfully tested last week and is now on its way to Bermuda. The two Dutch tugs which are towing it are making about 100 miles a day and it is expected to take forty days altogether to tow it to its destination. The London Times publishes the following account of the test:

The lower reach of the Medway was the scene of an experiment which is without parallel in the records of the navy, so far, at any rate, as British waters are concerned. A line-of-battleship in commission, of about 11,000 tons displacement, with all her armor, guns and stores in position, was lifted bodily out of the water. The feat formed part of the official trial of the new Bermuda floating dock which has recently been brought round from the Tyne, where it was constructed by Messrs. C. S. Swan & Hunter of Wallsend. The structure is 545 ft. long, and the side walls are 53 ft. 3 in. high. It is capable of lifting a vessel, if needed, of 17,500 tons in weight and drawing 32 ft. of water. The contract was to lift a 15,200-ton ship. The design has been carried out under the direction of Mr. A. E. Richards of the director of naval construction's department and Mr. A. Spyer of the department of the engineer in chief. The plans have been prepared

timber so that they extended horizontally from the side walls of the dock to the ship's sides, and these were tightly fixed by means of wedges driven between their ends and the dock sides.

The Sans Pareil was now just resting on the keel blocks and tightly pinned on the center line of the dock. The time occupied in berthing the vessel and in fixing and putting the shores in place was about two hours. The eight large circulating pumps were started shortly after 2 o'clock to clear the dock of water. In this part of the proceedings care has to be taken that both sides rise equally; otherwise a considerable strain may be thrown on the struts on one side. The work now was carried on under the direction of Mr. Lyonel Clark, who has had considerable experience in these operations, and of Mr. Denton of the firm of Swan & Hunter. Pumping was continued until the tips of the propeller blades were showing, and the spur or ram bow was well out of water. At 3 o'clock the pumps were stopped, and a fresh row of shores was put in position on each side.

The successful docking of a heavy battleship under conditions by no means the most favorable shows the utility of floating docks; and, though there are divided opinions as to the rival merits of the excavated graving docks ashore and the floating structure, there can be no doubt that the advocates of the latter have scored a substantial success in the operations



THE STEAMER WESTERN STATES OF THE NEW DETROIT & BUFFALO LINE.

by Messrs. Clark & Standfield of Westminster. The two chambers formed by the side walls of the dock contain a considerable quantity of machinery, which has been contracted for by the Wallsend Slipway Co. and installed under the direction of Mr. A. Laing.

The vessel that the admiralty had selected to be docked was Sans Pareil. She is 340 ft. long and 70 ft. wide. Her armor is 16 to 18 in. thick, and her principal armament consists of two 110-ton guns, which are both carried in a heavily armored turret well forward. It will be seen from this that though the Sans Pareil is not of so great displacement as the most recent battleships, there is a concentration of weight which is disposed to test severely any floating platform upon which she may be supported.

The dock has been moored in a deep part of the river, just off the mouth of the Swale, and at about high water the battleship, which was lying above Sheerness, was taken in charge by three tugs and brought up to the lower entrance of the dock. There was a smart breeze, and so long as the flood lasted there was quite a sea. There is, of course, a great difference between entering and grounding a big ship in a dock floating in still water, and carrying out the same maneuver in the run of a turbulent tideway. About 12 o'clock the ram bow of the Sans Pareil was entered between the walls of the dock. The ship was then drawing about 27 ft. 4 in. The dock had been sunk until only the tops of the walls were above the surface, and the tops of the keel blocks were just upon 28 ft. below the surface. The ebb tide had begun to make down strongly by the time the bow of the ship had been well entered. The wire rope cables were made fast, and the delicate operation of warping-in began. The tide was now running through the dock at over 3 knots, but as it was in the same direction as the wind, the water was smoother than before. The chief constructor of Chatham dock yard, Mr. James, took charge of the berthing, and under his direction the vessel was, after some time, brought within the dock and accurately placed in a central position. The operation of shoring up then began. An army of dock yard hands placed balks of

in the Medway. It will perhaps be remembered that the United States battleship Illinois, a vessel of over 11,000 tons, was recently docked in the same manner. The Americans, however, proceed on a different plan. In place of poising a ship on her keel and trusting to shores to keep her upright, they build into the ship's structure docking keels, of the nature of bilge keels, so that the vessel sits upright on level blocks. It is said that these keels do not detract appreciably, if at all, from the speed of the vessel. This is a statement that would have received little credence a few years ago, but recent investigations into the subject have shown that the supposed resistance due to bilge keels has been much overrated, especially when the vessels are steaming in anything other than smooth water. However this may be, there is no doubt that the extra keels much facilitate docking operations, either in floating docks or otherwise, the fitting of the struts being a heavy and tedious operation.

It is remarkable with what energy the British navy is attacked by those who should be its most stalwart defenders. During the discussion of the navy estimates in the house of commons last week Lord Charles Beresford, rear admiral, scathingly criticized the deficiencies of the navy. He declared that the whole admiralty system was rotten and led to great extravagance and that there was a general want of efficiency in the navy. The customary result of these attacks is that the British people frantically vote millions to improve a navy which is far and away in advance of the navies of the world. But this, possibly, is the object of the attack.

Preparations are in active progress for the annual meeting of the Lake Superior Mining Institute that convenes in Duluth and in the Minnesota ore district next August. The matter is in the hands of W. J. Olcott, manager of the Mesabi mines of the United States Steel Corporation.



### OBSTACLES TO THE ALL-CANADIAN SERVICE.

The following dispatch from St. John's, N. F., to the New York Sun shows that an all-Canadian service to meet the Morgan competition has many natural obstacles to overcome. It is not likely that any service can ever be formed which will shift the ebb and flow of travel from New York:

The present talk of establishing a fast all-British service across the Atlantic to some Canadian port to compete with the recently formed steamship combination naturally brings up the question of the port to be chosen as the Canadian terminus of the line. Here are some facts about Canadian ports that have been talked of for the purpose. It is well known that the sea road between Canada and England is shorter than between New York and England. A five-day ship to New York means a four-day ship to the Canadian mainland, though the time might be considerably prolonged if the terminal was placed at Montreal or Quebec instead of Sydney or Hawkesbury in Cape Breton. One scheme at the present time is for a line between Galway, Ireland, and Hall's bay, Newfoundland, with railways and ferries completing the connections on either side. There are so many breaks in the chain of direct communication by this route that, although it is unquestionably the shortest and most direct between Europe and America, it will not be a practical factor in transatlantic transportation for many years to come.

The Newfoundland railway is a narrow gauge line. Its enlargement to the standard gauge and its construction to Hall's bay would cost some millions, and the ocean part of the journey would be safe for only six months of the year, owing to the presence of ice fields in the water around this coast.

The Canadian Pacific railway wants the steamers to run to Quebec in summer and Halifax in winter. Quebec is the eastern terminus of the railroad. It could sell a ticket in London which would carry the holder to Liverpool by rail, thence to Quebec by boat, across Canada by rail again, and by another ship to Hong Kong or Australia, all by its own system and without the traveler setting foot on any but British soil or being conveyed by any but British ships and railways.

It is asserted that the company is at the present time negotiating with the Canadian government for an adequate mail subsidy for the establishment of the fast Atlantic steamers which are necessary to complete this scheme. The proposed Atlantic service would be a weekly one, the capital would be \$25,000,000, and the subsidy is estimated to be \$1,000,000 yearly. There is strong ground for the belief that a fast Canadian line via Quebec would never be a success. The St. Lawrence route is too dangerous to be followed at breakneck speed of the modern ocean greyhound. Even third-rate passenger boats and tramp freighters, which now navigate it, have to crawl through the gulf and river waters at half speed when fog prevails, which is very often, or when ice is about, which is until August in almost every year. During the winter the St. Lawrence is not navigable at all; it is frozen up solid, and all shipping has to be diverted to Halifax or St. John. During the spring it has to be reached by way of Cape Race and Cabot strait, to the south of Newfoundland, involving a detour of nearly 200 miles, a loss of about half a day. Only in the summer, for about five months, is it possible to traverse Belle Isle strait, the direct road to Quebec. But even then the advantage of the shorter mileage is offset by the drawbacks due to fog and ice. Belle Isle strait is only about twelve miles wide, with cross currents and variable indrafts, and when fog envelops it there is no prospect of quick transit. The same conditions are found to prevail more or less in the Gulf of St. Lawrence and in the river, where, with land in the immediate vicinity and the shallow waters admittedly dangerous, no shipmaster would risk a \$3,000,000 greyhound, or even a cheaper boat, racing at top speed to break an ocean record.

Transoceanic passengers would not be likely to patronize such a route, more especially when the melancholy catalogue of wrecks in connection with it is recalled. If these occur with 10, 12 and 14-knot steamers, what may not be expected with ships of 22, 23 or 24 knots, such as would be required for a modern fast service? Between Montreal and the open Atlantic east of Belle Isle fully 1,000 miles of dangerous coastbound waters intervene. It would take a fast liner fully two days to cover that distance at top speed, even if it were not necessary to take precautions against fog, ice, currents and other risks. The fastest ship would soon lose in the grip of an impenetrable fogbank the advantage she had gained by her rapid run across the unobstructed ocean. As conditions now are the ships which are foremost in the St. Lawrence traffic never make any quick passages, and while the route is the national one and convenient for Canadians, that is the most that can be said for it, and it attracts no American business.

Another plan which is being warmly advocated of late is for a fast line from Liverpool to Sydney, Cape Breton, with the alternative of Milford Haven, Wales, as the British terminal. Milford has the advantage of being a better port, not depending upon tides and having large opportunities for development and being nearer America by a few score miles, with every requisite in the way of dock and railway facilities. From Liverpool to Sydney, assuming that the former port is chosen, is 2,240 miles, and Sydney has the advantage of being open all the year round, with a capacious and accessible harbor and an admirable location for a future center of Canadian maritime progress. But Sydney, likewise, has a disadvantage. Cape Breton is an island and is cut off from Nova Scotia by Canso strait. This is about two-thirds of a mile wide, and is now crossed by means of a ferry which involves the loss of an hour in transferring from one train to the ferry and from it to another train, not to speak of the inconvenience. It is now proposed to bridge this strait, because at Sydney there has been built the big steel smelting plant which is expected to prove such a competitor for American concerns, and it is believed that the trade which will develop there in due course amply warrants the outlay on the bridge. It could not be completed within four or five years at the earliest, and until such a convenience is provided a very serious drawback will exist to operate against a fast-line scheme. A lesser disadvantage, existing at present but more easily remedied, is that the present route of the Intercolonial railway forms almost a semicircle following the southern bank of the St. Lawrence by way of Gaspé to Quebec. This circuitous line again neutralizes any gain there might be from a fast ocean service, by compelling the traveler to go hundreds of miles out of his way in a roundabout railroad ride. What is necessary is a new line of the Intercolonial striking directly through the country between Quebec and the Atlantic tidewater, thereby

reducing the railway time by one-half, and making it possible to provide fast trains.

As the foregoing shows, not one of the proposed Canadian routes is in itself satisfactory. The Newfoundland one is impossible just now. The Quebec one is defective in that fast time cannot be made by it. The Sydney one lacks essential links to make it a perfect system. Clearly, then, the outlook for a Canadian service is not bright. It is not possible that first-class liners could be made to pay on a Canadian route unless largely aided by American passenger traffic, and under the conditions which must militate against such a service that is not likely to be forthcoming. New York must continue, by reason of its very situation and myriad advantages, to be the great center through which will flow back and forth the tide of travel across the Atlantic. No Canadian port can compete with it; no expenditure of money or effort can offset the superiority which it enjoys.

### ARGUMENT FOR THE SHIPPING BILL.

Mr. Andrew Wheeler, treasurer of the American Iron & Steel Association, is a well-known Philadelphia iron merchant and an active participant in the movement to pass the shipping bill. He expresses in a recent interview some interesting views concerning the relation of the proposed subsidies to the combination of transatlantic steamship lines. He says:

"No American need allow himself to be troubled in consequence of the successful carrying out of the plan. On the contrary, he may rejoice and take courage that, in the ocean carrying trade, in which this country has not up to this time borne any conspicuous part, it should now, under favoring circumstances, be placed in a position to exercise a dominant part in directing and controlling the international transatlantic service. Intelligent observers need not be reminded that the grouping of our great railway systems into a few hands has precipitated and made easy the combining of the leading steamship lines into one management. Looking at the outward transatlantic service it will be seen that England takes from us mainly agricultural products. These products are brought to the seaboard by associated lines of railroads, among which complete harmony exists. Perhaps we are not overstating the matter in saying that the ultimate shipment of this vast tonnage can not only be influenced but actually determined by the actions of the railroads.

"Yet transporters will not suffer or be forced to pay exacting rates. The economies that are possible under combined management will recompense the owners, and the lessened competition will give steadiness and earning value to the securities of the corporations. If in the proposed combination England shall appear to be less of an important factor than she has been in the past the loss will seem infinitesimal so long as she remains supreme among the great purchasing nations of the world, such as China, Japan, Australia and the east and west coasts of South America. Here her commerce is undisturbed and undisputed, except by the merchant marine of Germany, which forms but a small percentage. At this time the United States is not an element in that field, for with the exception of one line to Laguayra, we know of no regularly maintained lines to the countries named, representing as they do a population of over 500,000,000 people, mainly dependent upon England for manufactured goods, supplying to England her chief source of wealth, and employing, actually, hundreds of lines of steamers. It is in this field rather than in the transatlantic service that the friends of the American merchant marine look for great national results. The passage of the shipping bill would immediately put on foot projects resulting in lines to all the distant markets named, and, aside from the direct employment of thousands of people, would stimulate as no other plan can the export of American manufactured goods. The failure to pass the shipping bill will leave matters in these vast fields of activity precisely as they are, England and Germany controlling with undisturbed sway these wide markets, with no possible chance of any increase at present in American lines. The compensation under the shipping bill would not go to the transatlantic service now, as the lines are under contracts having nearly five years to run, but would be immediately applicable to the countries we have named. Under the provisions of the bill it would not be possible to make available at present over three millions per year, and as this is less than one-half of one cent per annum on our population not much weight need be given to the 'burden of taxation' which the bill would inflict, especially since it appears that the complaint is largely from foreigners or those having foreign associations. At all events they are not those who feel as Americans the deep humiliation of present conditions and burn with patriotic desire that something uplifting to American interests shall be done by the present congress."

The iron trade is still adding new tonnage to its bookings for 1903, and consumers have found that pig iron, steel billets and the heavier forms of finished material are increasingly difficult to get for this year's delivery. Steel rail contracts already made for next year amount to about 700,000 tons and it is estimated that 1902 tonnage on the books that cannot be rolled this year will increase this amount to 1,000,000 tons. The railroads give no sign of being less liberal buyers in the coming year than in the year ending with the first half of 1902. Locomotive works are sold up well into 1903 and have even taken orders for 1904. In car construction also there is no indication that the pace will be slackened in the year just ahead.—Iron Trade Review.

The Saginaw Steamship Co., which began operating ships when the steamers Keweenaw and Mackinaw were built at West Bay City, Mich., several years ago for salt water service, has lately acquired considerable vessel property. The company has just bought the British Queen, which was burned in New York harbor some time ago, and will make a tanker of her. F. H. Weeks, ship broker of 32 Broadway, New York city, has secured a five-year charter for the British Queen in Texas oil trade. The Saginaw company recently took over the property of the Progressive Steamship Co., which was operating three or four good vessels on the Pacific. The company's fleet is to be still further augmented by a tanker building at Newport News.

All charts published by the government (navigators charts) are handled by the Marine Review as government agent.



### SKETCH OF MR. ROBERT MORAN.

Robert Moran of the Moran Bros.' Co., ship builders at Seattle, has been called the "Andrew Carnegie of the Pacific northwest." He is a young man, only forty-five, strong, sturdy, determined, with an ambition that knows no such word as fail, and he is probably good for twenty-five more years of active, driving work. He is a man who recognizes an opportunity and knows how to grasp it. He went to Seattle twenty-six years ago without a dollar and without education. He conceived the idea of a great ship building and manufacturing plant, foreseeing that Puget Sound was destined to some day become a commercial and financial center. He is now beginning to realize the result of plans laid twenty-six years in advance of the time they could possibly be brought about. He has hewn to the line steadfastly and at the present time is building for the United States government the \$3,800,000 battleship Nebraska on the waterway and at the exact spot laid out in his plans for a ship yard made seventeen years ago. An interesting event in the history of this plant will be celebrated July 4, when the keel of the Nebraska will be laid, the guest of honor for the occasion being the governor of Nebraska, accompanied by his entire staff.

Robert Moran's career reads like a character from Dumas. He was born in New York state Jan. 26, 1857, and when a small boy his parents moved to Montclair, N. J. At thirteen years of age he went to work for himself in a machine shop. At seventeen he went as far west as Cincinnati, doing a man's work in a rolling mill. In 1875 he went to San Francisco, but saw no opportunity for advancement there and so went on to Seattle. He landed there with just ten cents in his pocket. The town was then a village of 3,000 people and was very quiet. He secured a job in the restaurant of a negro named Bill Gross. Gross—well named, for he weighed nearly 400 lbs.—was well-to-do and quite a character. He was attracted to Moran and one day secured a job for him as cook in a logging camp on the shores of Lake Washington. Moran had never cooked in his life but he tackled the job with that apparent outward nonchalance which has characterized his actions ever since. He lasted three days. He was willing to do the work, but the loggers refused to eat his food. He returned to Seattle and immediately secured a position as night watchman on the little steamer Zephyr, and soon after became her fireman. He later served as fireman on the little steamer Nellie Libby and other similar boats. He was consumed with an ambition to establish himself in business and at that time had clearly defined in his mind a plan to build up a ship building and manufacturing plant. With this in view he began a systematic study of mathematics, mechanical engineering and draughting. A good portion of his small wages was paid to Capt. Bulline, who was in the employ of the United States government, for lessons. In 1878 he went to Alaska as fireman on the Stikine river steamer Cassair. The engineer proved incompetent, and Moran was made chief engineer. He went back in the fall of 1880 and started his first shop, occupying an old corner in H. L. Yesler's saw mill about 10x30 ft. and just high enough to admit of his standing upright. He had only a hat full of tools, but he started in confidently. He kept writing to his six brothers encouraging them to come out—and he brought them out one at a time as the shop grew and their services were needed. He soon built a larger shop and in 1885 he was the owner of a modern shop, established on broad lines and doing a good business. In 1888 Moran took the first step toward his long cherished ambition when he organized the Seattle Dry Dock & Ship Building Co. and commenced the erection of a plant that included a marine railway. He also built a larger and better machine shop, including a new foundry. Then he was elected mayor of Seattle, a place of over 18,000 people. It was against his protests, but he was serving as mayor on June 6, 1889, when the city was entirely wiped out by fire. His quickness of intuition and the wisdom of his ready decisions were apparent on that occasion. Moran saw that his plant was doomed. Before the fire reached his building he was dictating telegrams, ordering lists of machinery, tools and supplies for the equipping of a larger plant, for he foresaw that the demand for structural iron in the rebuilding of the city would be great. He lost his plant, but within twelve months he had not only entirely recuperated but had made greater profits than during the previous five years of his business.

Moran's history is the history of his plant, and it is a reproduction of opportunities seen and seized. In 1890 he built his first steamer. Then he designed and built in 1892 for the government the big pumps and engines for the navy yard at Bremerton at a cost of \$150,000. Then he built the torpedo boat Rowan at a profit to himself—and the boat exceeded her speed allowance by more than a knot. The other ships built for the government were the revenue cutter Golden Gate, now in commission on the Pacific coast, and the transport Seward. In December, 1900, he put in a bid for two of the largest battleships ever built by the government. He was given one ship provided he cut his bid. He notified the people of Seattle that he would be required to take the ship for \$200,000 less than he had bid and said that, if the people would guarantee him \$100,000, he would cut his bid \$100,000. Within a week the citizens pledged the \$100,000, and the result is Moran is now building the Nebraska.

Moran Bros.' plant covers twenty-six acres and is a bee-hive of activity. Its appraised value is \$1,800,000. Over a hundred vessels of various descriptions have been repaired there, or rebuilt, during the past four years; seventy-five of them representing a charge of \$10,000 or over for each, the total cost being more than \$2,000,000. The plant has fitted out twenty government transports, each representing an expenditure of from \$15,000 to \$40,000, while the general commercial work has been very heavy in volume. Three of the Moran brothers are dead and there are three still actively connected with the company, of which Robert Moran is president and general manager, the other two brothers being foreman and superintendent of different mechanical departments of the institution. The plant is owned solely by the brothers. Robert Moran is married and has four children. Mr. Moran's faith in the far northwest and Alaska is unbounded. "No part of the world has a greater future than the North Pacific coast," said he. "We have everything here and nothing can check our expansion. Alaska? It is the greatest country on earth and covers so vast an area that few people can grasp its immensity. Most people think it is a frozen, barren region, but it is a most beautiful country. The region around Dutch harbor and all along the southern coast is beautiful and productive. It is all tributary to Seattle and Puget Sound and will materially aid in the establishment at Seattle of a great commercial center."

### AROUND THE GREAT LAKES.

Capt. Baker of Duluth has purchased the schooner Nellie Reddington from her Cleveland owners for \$12,000.

Wm. M. Olcott, who built wooden vessels in Chicago in the fifties, died a few days ago at Norwich, Conn.

A new steamship line, to be known as the Algoma Navigation Co., is being formed to operate a line between Owen Sound and the Sault.

Lorain will present the government with a site for a life-saving station and it is more than probable that a station will be established there shortly.

Keller Transportation Co. is the name selected for the Hawgood corporation that will operate the steel steamer Harold B. Nye, launched at Lorain a few days ago.

John G. Bullan and Capt. O'Hagen of Buffalo have purchased the steamer Nebraska from Samuel Neff & Sons of Milwaukee. The reported price was \$18,000. The steamer will be rebuilt into a lumber carrier at Chicago.

It has been agreed in conference of committees representing both houses of congress that the sundry civil bill shall contain the following items: Peshtigo reef light vessel, \$15,000; Crisp point, \$18,000; Point au Pelee lightship, \$45,000, of which \$4,000 is immediately available; Conneaut lighthouse on pier, \$8,400; Ashtabula light and fog signal, \$18,000.

Capt. M. Fitzgerald, whose license was revoked by government inspectors at Duluth as a result of his vessel, the George G. Hadley, sinking the whaleback steamer Thomas Wilson off Duluth harbor recently, will appeal to Supervising Inspector Sloane at St. Paul for reversal of the Duluth verdict. If the supervising inspector upholds the Duluth decision appeal may be made to the secretary of the treasury. Papers in the appeal case are being prepared by Attorney Charles E. Kremer of Chicago.

The metamorphoses through which lake vessels pass before they may be said to cease to exist is very interesting. Such a thing as total destruction is very rare. We would not be surprised if the hull of the old schooner Algonquin (sacred to Lake Superior history prior to the canal) should be resurrected from the bullrushes near West Superior and placed in commission in some form or other. Now the oldest tug in the Chicago river, built in 1858, is to be reconstructed for service in the passenger business between Mackinaw City and St. Ignace, Mich. This tug is the Michael Brand, which was built for the Brand Brewing Co. and carried its products from the brewery to the warehouses before any railroads existed on the north side of Chicago. The Brand was built for navigation in the north branch of the Chicago river before any dredges were used in that stream, and when the river at the brewery was but a small creek. She originally drew but little over 4 ft. of water. When railroads paralleled the north branch the Brand's usefulness dwindled, and the brewing company sold the vessel for harbor towing. She was later denuded of her machinery, which was put in another tug, and her hull has for several years laid idle on the lake front. Work on the reconstruction has already been begun. Herman Schultz will be the owner and master of the new steamboat when ready for the straits.

### BRITISH AND GERMAN STEEL PRODUCTION.

(Bulletin American Iron and Steel Association.)

Mr. J. S. Jeans, secretary of the British Iron Trade Association, reports the production of pig iron, Bessemer steel, and open-hearth steel in Great Britain in 1901 as follows: Pig iron, 7,761,830 gross tons, against 8,959,691 tons in 1900, a loss of 1,197,861 tons; Bessemer steel ingots, 1,606,253 tons, against 1,745,004 tons in 1900, a loss of 138,751 tons; open-hearth steel ingots, 3,297,791 tons, against 3,156,050 tons in 1900, a gain of 141,741 tons.

Dr. H. Rentzsch, the statistician of the Association of German Iron and Steel Manufacturers, reports the production of pig iron in Germany and Luxemburg in 1901 as amounting to 7,860,893 metric tons, against 8,520,541 tons in 1900, a loss of 659,648 tons. He also reports the production of steel ingots and castings in Germany and Luxemburg in 1901 as amounting to 6,394,222 metric tons, against 6,645,869 tons in 1900, a loss of 251,647 tons.

Adding the production of pig iron by Great Britain in 1901 to that of Germany and Luxemburg, and reducing metric tons to gross tons, gives us a total production of pig iron by both countries in 1901 of 15,498,493 gross tons, or 379,861 tons less than the production of 15,878,354 tons by the United States in the same year.

Assuming that the production of crucible steel in Great Britain in 1901 amounted to 95,956 gross tons, that country's total production of steel in that year would be exactly 5,000,000 tons, her total production of Bessemer and open-hearth steel being 4,904,044 tons. Adding Great Britain's estimated total production of steel in 1901 to the total steel production of Germany and Luxemburg in that year, after reducing the latter's production to gross tons, gives us for both countries a total production in 1901 of 11,293,170 gross tons, or 2,180,425 tons less than the production of 13,473,595 tons by the United States in the same year.

From the mining statistics branch of the British home office we learn that the total production of coal in Great Britain in 1901 amounted to 219,046,945 gross tons, against 225,181,300 tons in 1900, a decrease of 6,134,355 tons. The production of iron ore in Great Britain in 1901 was 12,275,198 tons, against 14,028,208 tons in 1900, a decrease of 1,753,010 tons. Dr. Rentzsch reports the production of coal in Germany and Luxemburg in 1901, including brown coal, as amounting to 152,628,931 metric tons, against 149,788,256 tons in 1900, and the production of iron ore as amounting to 16,570,258 tons, against 18,964,294 tons in 1900.

Secretary W. L. Capps of the Society of Naval Architects and Marine Engineers invites correspondence concerning papers to be read at the tenth annual meeting in November next. He says: "The council is authorized to offer a prize not exceeding \$200 in value for the best paper upon some subject directly pertaining to naval architecture or marine engineering. Papers submitted in competition for the prize must be sent to the secretary before Oct. 1, and should be plainly addressed and marked in one corner 'for prize competition,' and underneath, the motto or other distinguishing title of the sender. In a sealed envelope similarly addressed should be enclosed the name of the sender and his motto or distinguishing title."



# CONCRETE BREAKWATER CONSTRUCTION AT BUFFALO.

BY MAJOR W. T. SYMONS, CORPS OF ENGINEERS, U. S. A.

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During the last century, when the necessity for breakwaters at some of the lake harbors became recognized, the only ones in existence throughout the world were those of stone and masonry, costing from \$500 to \$1,500 per lineal foot. Such expensive structures were beyond the financial resources of our people at the time. With true American adaptiveness, however, another type was designed of far less cost, which has done good service. This was composed of a row of timber cribs sunk in place, filled with stone, and surmounted by a continuous superstructure of timber filled with stone and decked over with planking. The cheapness of timber,

and still is in progress. This work was designed by Col. Jared A. Smith of the corps of engineers. A cross-section of this superstructure as built is shown in Fig. 2.

A wooden breakwater with a concrete superstructure may properly be considered as a permanent structure, reasonably secure against decay and deterioration. The question therefore naturally arises, why not put the concrete superstructure on at first? The answer is that most of the lake breakwaters are built on the ordinary lake bottom of clay and sand, and for some years after they are completed settlement and displacement

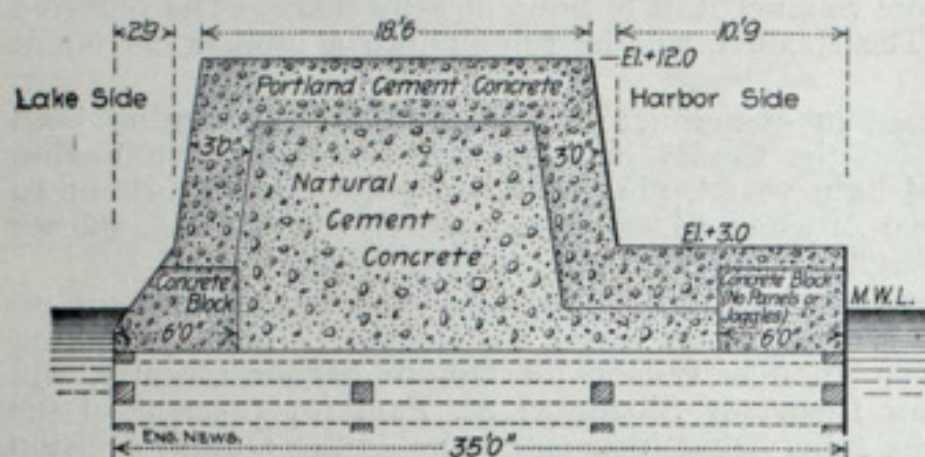


Fig. 1. Typical cross-section of old concrete superstructure for Buffalo breakwater, 1887-1891.

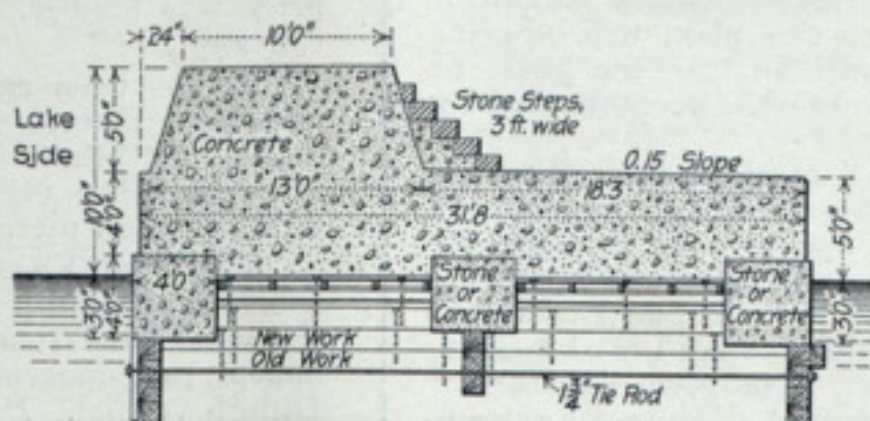


Fig. 2. Typical cross-section of concrete superstructure for west breakwater, Cleveland harbor.

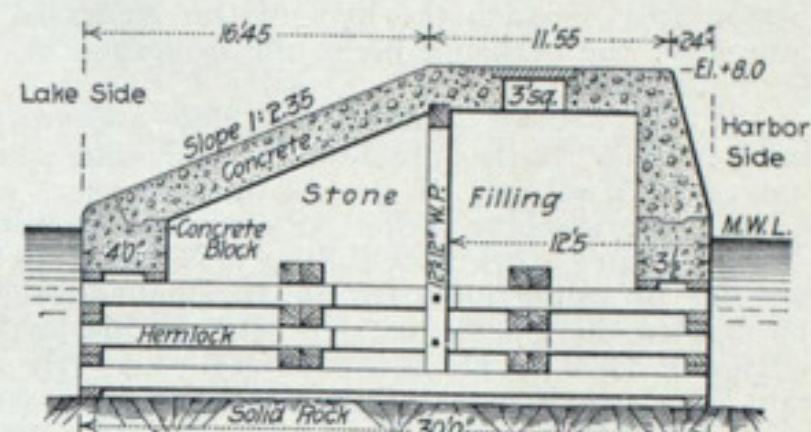


Fig. 3. Typical cross-section of concrete shell superstructure for Dunkirk breakwater.

and the fact that these structures were built in fresh water and free from the ravages of the teredo and other destructive marine insects, justified the character of the structures. In the aggregate a large amount of this general type of structure has been built at the lake ports. In such structures there are two distinct features—the substructure, or part below water, which, on account of the preservative properties of fresh water on wood, has a very long but indefinite life, and the superstructure, the part above water, the wooden portion of which, being exposed to the action of the elements, decays with greater or less rapidity. This superstructure is also

occur, which are generally of unequal character in different portions of the structure. Nearly all wooden breakwaters, piers, etc., present a wavy appearance, due to this unequal settlement and displacement. The wooden superstructure adapts itself to this without serious harm, but a rigid superstructure of masonry would be very seriously injured by it, rendered very unsightly, and perhaps be completely ruined. By the time the wooden superstructure has rotted off the whole structure will have reached its final settlement and be in a condition of permanent stability and fitted to receive its rigid concrete superstructure.

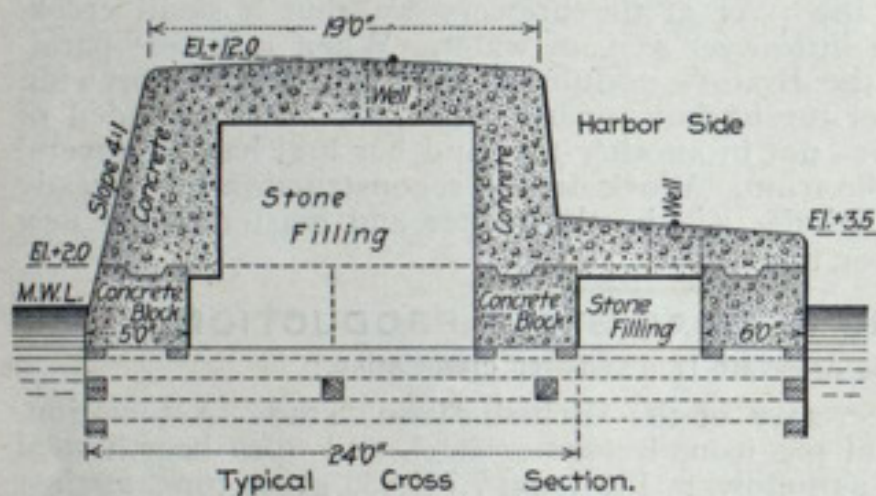
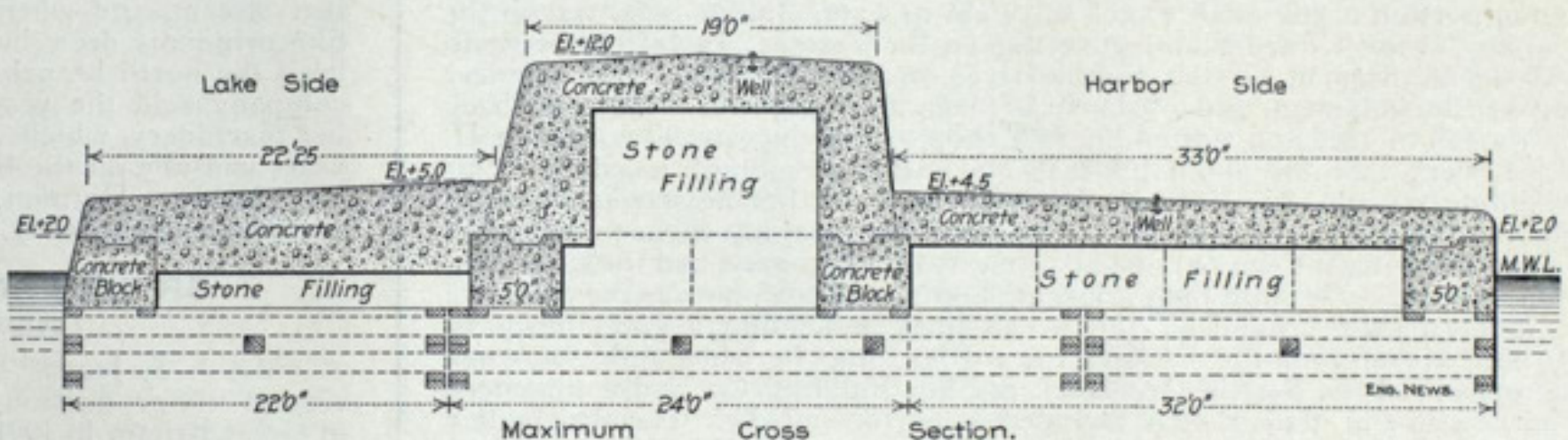


Fig. 4. Maximum and typical cross-sections of concrete superstructure for old breakwater, Buffalo.



exposed to the physical destructive action of waves, ice, boats and vandals, and requires constant repairs, and, finally, when sufficiently weakened by decay, complete renewal. In several instances on the lakes where this renewal has been found necessary it has been done by substituting a concrete superstructure for the old wooden and stone one.

The first fully-exposed wooden and stone breakwater to be built on the great lakes was at Buffalo, and at Buffalo was also built the first concrete superstructure to replace the old wooden one which had become dangerously weakened. This was done under the direction of Capt. F. A.

An exception to the general system of consecutive construction as outlined above is where the new breakwater is founded on rock or other bottom of sufficient rigidity. Such is the case in two points in the district under my charge. At Dunkirk, N. Y., an extension to the wooden breakwater was built by me in 1898, and as it could be founded upon the rock bottom, it was built in the first place of timber crib filled with stone, with a concrete superstructure. Fig. 2 is a section of this breakwater, which has the distinction of being the first concrete shell breakwater superstructure to be built on the lakes or elsewhere, as far as I know. The second



Fig. 5. Junction of timber crib superstructure and concrete superstructure, south harbor breakwater, Buffalo.



Fig. 6. Timber superstructure as it appeared after being wrecked by storm.

Mahan, corps of engineers, U. S. A., and consisted of solid concrete, conforming generally to the shape of the wooden superstructure which it replaced. Concrete blocks were used about the water's edge. A cross-section of this breakwater as constructed is shown in Fig. 1. The heart was of natural cement concrete, the exposed portion of Portland cement concrete. During the years 1887 to 1891, 3,878 lin. ft. of this solid concrete superstructure was built.

For some years past the work of replacing the superstructure of the Cleveland, O., breakwater with a solid concrete superstructure has been

point where a new breakwater was built with timber and stone substructure and concrete superstructure was at Buffalo, at the northern portion of the harbor, where rock foundation also existed. The concrete shell superstructure surmounting this breakwater is similar in all material respects to that illustrated as used in putting a new superstructure on 1,015 ft. of the old breakwater at Buffalo.

When a portion of the old breakwater at Buffalo received a new concrete superstructure, in 1887-91, a section of 1,015 ft. was left in its original condition, because it was deemed that the substructure was not in a suffi-



ciently stable condition to receive the concrete superstructure. This was finally remedied by dumping and placing large amounts of waste stone along its lake side, and during the years 1899 and 1900 it was put into a permanently good condition by building upon it a concrete shell superstructure. This had to be made to fit the existing cribs, which, owing to serious trouble when the breakwater was built, were sadly out of shape. The ordinary and the maximum cross-sections of the superstructure as built is shown in Fig. 4. During the fall of 1900 the new timber crib breakwater near Stony point was badly wrecked by the tail end of the great Galveston storm, which, sweeping up through the Mississippi valley, paid Buffalo a visit on its way to the North Atlantic, and by a more severe storm about six weeks later. The substructure of the breakwater, the cribs, was uninjured, but it was found to be necessary to replace about 1,800 ft. of the superstructure. Several plans were made for rebuilding this superstructure—with wood and stone, with large quarried stone, and with concrete. The following considerations led to the final selection of the material and design adopted for the new superstructure:

(1) The locality requires excessive strength, as owing to its being right on the axis of the lake and in the deepest water, it is subjected to stronger wave action than at any other point along the lake front of Buffalo.

(2) The structure had been well pounded down by the waves so that it could be considered to have reached its final settlement, unless its weight was greatly increased. It was therefore in a condition to receive a concrete superstructure.

(3) The exposed condition of the substructure demanded that the superstructure be added with the least possible delay.

(4) If the new superstructure was built of timber and stone, it would have to be built stronger than before and would require much more and heavier timber. As the cost of timber had enormously increased of late, and as the settlement of the whole structure did not demand the use of timber, it was deemed unwise to use it.

(5) A good superstructure could be built of large stone from the Canadian quarries and at a comparatively low cost, but it was found that the work could not be done under two years at least. It was considered too dangerous to leave the damaged work unfinished for that length of time.

(6) Contractors were willing to undertake to put a concrete superstructure on the wrecked portion in one working season, and this was finally decided on, and the work was carried on during the whole working season of 1901.

As this is the latest concrete superstructure to be built, and as it represents the latest and best practice and the wisdom gained by experience on several other similar works, both by the engineers and contractors, it is here quite fully described. The adoption and development of the concrete shell type of breakwater superstructure is regarded as important. It has all the advantages in weight and strength of a solid concrete superstructure at a greatly reduced cost. By varying the size of blocks and thickness of walls and decks and general outline, it can be adapted to loca-

The portion of the timber crib breakwater which was wrecked is that lying to the north of the entrance, and which will abut end to end with the stone breakwater when the latter is finished, and is known as the South Harbor section of the work. In this portion of the work, the substructure, or part below water level, as originally constructed, consists of timber cribs filled with rubble stone and founded on an artificial foundation consisting of a layer of rubble stone about 8 ft. high, resting on a bed of gravel from 30 to 40 ft. deep, which was backfilled into a trench excavated to bed rock. The cribs were so sunk that their tops were practically at the

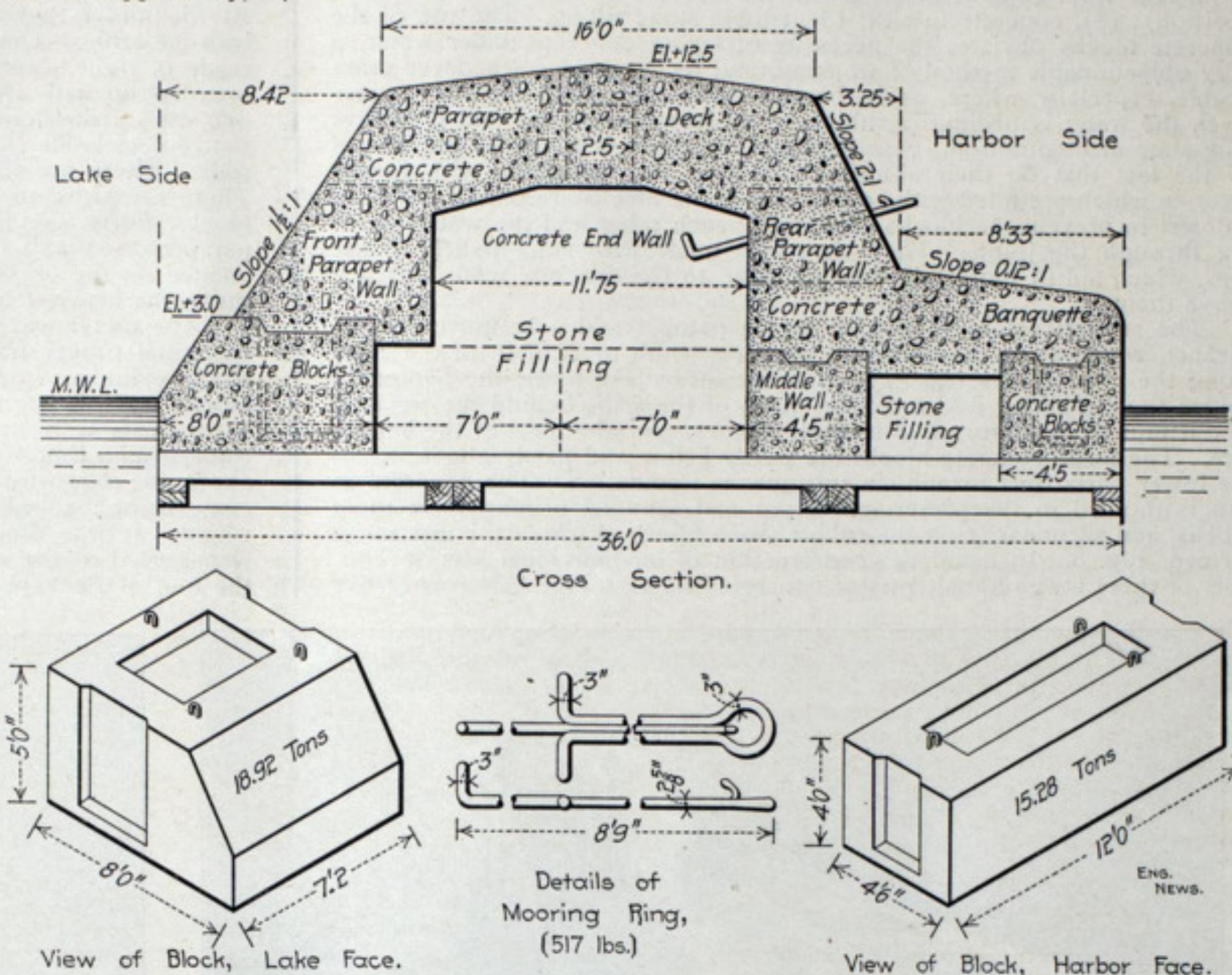


Fig. 7. Typical cross-section of concrete shell breakwater for replacing timber superstructure wrecked by storm at Buffalo, and isometric views of face blocks.

level of mean lake water. This substructure has a length measured along the line of the lake face of 2,739 ft. There are in all sixteen cribs, one short crib and fifteen long ones. The short crib, which is located at the south end of the structure, is 60 ft. long, 36 ft. wide and 22 ft. high, and is placed with its longer length at right angles with the axis of the structure, and thus extends 24 ft. inside the general harbor line. This acts as a buttress and an emplacement for a lighthouse which is being built on it. The longer cribs are each 180 ft. long, 36 ft. wide and 22 ft. high. The original alignment of these cribs was almost perfect, the extreme variations from a straight line not exceeding more than a few tenths of a foot. Resting upon this substructure of cribs was a superstructure of similar construction to the cribs, and also filled with rubble stone. The superstructure was built in five sections, the first having a length of 576 ft., the other four being in nominal lengths of 540 ft. each. It consisted of a banquette, a middle deck, and a parapet, each 12 ft. wide, and at elevations of 6, 10 and 12 ft., respectively, above mean lake level, the highest part being next to the lake. This is plainly shown on the accompanying photograph, Fig. 5.

The structure was finally completed on Oct. 27, 1900. It suffered great damage from the gale of Sept. 12, 1900, and still greater damage from that of Nov. 21, 1900. This last gale was of unusual violence, the wind blowing at times at the rate of 80 miles per hour from the west. The water level at 6 o'clock in the morning of this day was 2 ft. below mean lake level; at noon it was 1 ft. above; at 4 o'clock in the afternoon it had reached a point 6.4 ft. above; and at midnight it dropped down to 3 ft. below mean lake level, a wind-produced variation in water level of 9.4 ft. in about 8 hours.

During this gale—it might more properly be called a hurricane—tremendous seas broke over the breakwater. The waves dashing against the vertical walls of the structure rose to a great height above it, variously estimated at from 75 to 125 ft., enveloping the breakwater in an immense sheet of water, which in falling struck the top of the superstructure with such force as to crush in the same, the large timbers of which it was constructed being broken like pipe stems (see Fig. 6). The direction of the breakwater being at right angles to the axis of the storm tended further to accentuate the destroying power of the furious waves.

When it came to the question of reconstructing this superstructure it was decided that concrete masonry was material best adapted to enter largely into its construction. The facility with which this material can be made and shaped into monolithic masses is a great point in its favor. When it was decided to replace the wrecked superstructure with one of concrete, it was considered expedient to disregard the usual practice of presenting a vertical face to the sea, but instead adopt a sloping face, with a view of reducing the impact of the waves, the idea being to reduce the height of the impelling water by translating its movement from nearly



Fig. 8. View of concrete blocks in place for breakwater superstructure.

tions with different and varying exposures and with great ultimate economy. On account of the high price of timber nowadays and the low price of cement, a concrete shell superstructure can ordinarily be built at a cost no higher than a wood and stone superstructure, and wherever conditions as to foundation and settlement can be met, it should be adopted in the future.

It seems proper to state that of the 12,800 ft. of new breakwater at Buffalo, 7,260 ft. is to be of stone and gravel, while the remainder on each side of the new south entrance was built of timber and stone. This was done largely that vessels might have mooring facilities near the entrance. The stone breakwater was not adapted to this.



vertical to an inclined direction, thus allowing the water to pass over the structure in a flowing mass without detriment to the same. The proper slope for the lake face that was believed to best attain this desideratum was fixed at  $1\frac{1}{2}$  on 1, corresponding to an angle of  $33^{\circ} 41'$  from the vertical. The cross-section adopted is fully shown on the accompanying drawing, Fig. 7.

The superstructure consists essentially of three main parts, viz: (1) Semi-submerged large concrete blocks, serving as a foundation and resting on the top of the stone-filled timber cribs with their bases 2 ft. below mean lake level (blocks are made in the open, and afterwards placed in position); (2), concrete in situ; (3), rubble stone filling. The use of the concrete blocks obviates the necessity of laying concrete under water, a very objectionable method of working, and to be avoided whenever practicable, especially where, as in breakwater construction near the water level, the water is ordinarily subject to violent fluctuations and is always in a state of commotion. A monolithic character is given to the blocks by the fact that on their abutting ends they are provided with joggle recesses which are filled with concrete after the blocks are placed, forming a dowel to prevent the blocks slipping by each other and the water washing through the joints. They were also made with sunk panels in the tops, which aid in more fully uniting them to the concrete made in place above them.

The superstructure is divided into a parapet and a banquette. The parapet, which is on the lake side, covers a width of 27.67 ft. of the cribs along the lake, and is 12.5 ft. high above mean lake level; the banquette covers the remaining 8.33 ft. of the width of the cribs behind the parapet. The banquette is uniformly 4 ft. high above mean lake level at the harbor face. The large concrete blocks are partly below and partly above water, the lower parts thus forming a subaqueous foundation. The concrete in situ is molded in the prescribed slopes and founded primarily on these blocks, and secondarily on the rubble stone filling of which the interior is formed, Fig. 5. In detail the construction of an individual section consists of three longitudinal rows of concrete blocks, a lake face row of five

spaced 8 ft. c. to c., while the spacing of the remaining eight rows is somewhat less and irregular, being dependent upon the superimposed load, which is variable. The piles are capped with 12x12-in. timbers placed longitudinally or parallel with the longer axis of the dock. The floor, which forms the bottom of the block molds, is made of 1 $\frac{3}{4}$ -in. planed plank, tongued and grooved, and of 10 to 12-in. widths placed transversely. The mixer is located in the middle of the dock on one side, while the derrick used for hoisting the concrete ingredients is located on the opposite side. Running the entire length of the dock and equidistant from each side are two tracks of 20-in. gage. The tracks are spaced 15.8 ft. c. to c. At the mixer they are connected by means of a transverse track and a transfer table. The tracks are supported on trestles about 5.5 ft. high, made of light scantlings set upright. The outer faces of these uprights boarded up with 1 $\frac{3}{4}$ -in. plank placed horizontally, and which also form one side of the concrete molds. The remaining parts of the molds consist of detachable sides and ends, held together when in use by short iron rods. There are four lines of molds, two on each side of each track. There are altogether seventy-five molds or forms, 30 for the lake face blocks, thirty-four for harbor face and interior wall blocks, and eleven for parapet cross-wall blocks. All the molds for the lake face blocks are located on the outside of the railway tracks, to avoid any extra lifting of these, the heaviest blocks.

The mixer was a 4-ft. cube mixer of the ordinary type, supported on the usual timber framework. It was driven by a small upright engine, single cylinder, 7 $\frac{1}{4}$ x8 in. The materials used in the manufacture of the blocks were brought to the dock in canal boats and deck scows. The canal boats were used for the transportation of the broken stone, which came from a limestone quarry located on the south bank of the Erie canal about one mile west of the town of Lockport, N. Y. The sand and gravel came from the bed of the Niagara river, near the head of Strawberry island. It was dredged from the river bed by a so-called sand-sucker, transported to the storing yards on the south bank of the Erie canal, at the foot of Pennsylvania street, Buffalo, where it was unloaded by a Mc-



Fig. 9. Parapet walls ready for placing deck. Concrete plant in position.

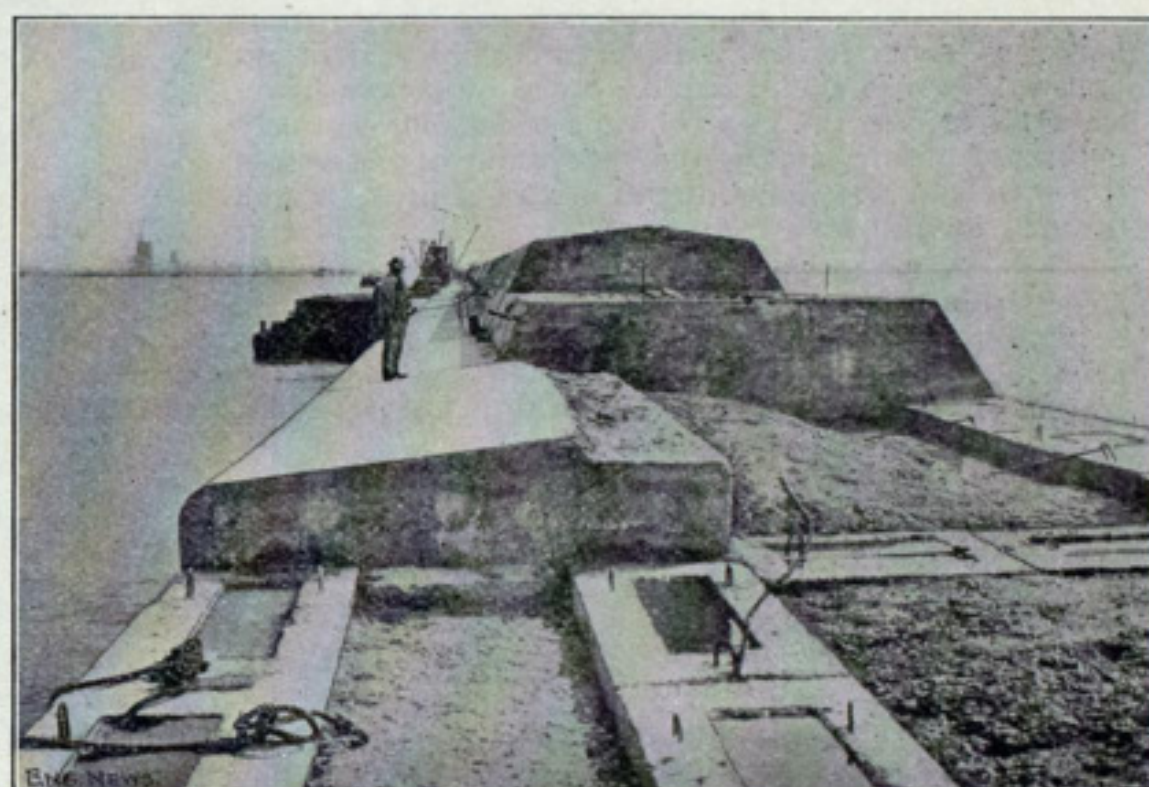


Fig. 10. Concrete superstructure in successive stages of construction—concrete blocks, banquette, parapet walls and deck.

blocks, a harbor face row of three blocks, and an interior row of three blocks. The ends of each section are closed by two blocks, connecting the lake face and interior rows, and by one block connecting the interior and harbor face rows.

All manufactured blocks were made with sunk panels on the top, and all lake face and harbor face blocks were made with joggle channels on the end faces. All blocks were further provided with steel eye-bolts for handling. The volume of each lake face block is 9.45 cu. yds., having an estimated weight of 18.90 tons. These blocks extend from 2 ft. below to 3 ft. above mean lake level. The harbor face blocks are true parallelopipeds. They are 12 ft. long, 4.5 ft. wide and 4 ft. high. The volume of each block is 7.64 cu. yds., having an estimated weight of 15.28 tons. These blocks extend from 2 ft. below to 2 ft. above mean lake level. The interior wall blocks are of the same dimensions as the harbor face blocks. The parapet cross-wall blocks are 7 ft. long, 6 ft. wide, and 4 ft. high, with a volume of 6 cu. yds., the estimated weight being 12 tons.

The procedure of constructing the concrete superstructure is as follows: The damaged timber superstructure with its accompanying rubble stone filling above the crib level is first removed, after which the top timbers of the cribs are brought to a uniform elevation of 2 ft. below mean lake level. Any deficiency in the rubble stone filling of the cribs is also supplied. Upon this prepared foundation the blocks for the different longitudinal and cross-walls are next placed, together with the rubble stone filling between them. The joggle channels are filled with concrete as soon as practicable after the blocks are placed. All the concrete work above the blocks is above ordinary water level and is built in the following sequence or order in each section: The banquette and lower section of the back parapet wall are first built, this part containing theoretically 54.55 cu. yds. The parapet walls are next constructed. This includes the upper section of the back parapet wall, the required volume of concrete being 81.04 cu. yds. The remainder of the stone filling is next placed, followed by the parapet deck, which contains 99.19 cu. yds., the total mass concrete being thus 234.78 cu. yds.

#### CONSTRUCTION OF CONCRETE BLOCKS.

All the concrete blocks were especially constructed for this work in the shallow water of Lake Erie, just off the shore at Stony point, and protected by the Stony point section of the new breakwater. The quarters of the contractors' employees were located on shore, access to the same from the concrete dock being effected by means of a plank walk supported on a staging of light timbers. The water at the site of the concrete dock is about 7 ft. deep, and the floor of the dock is about the same height above water level. The dock consists of 10 parallel rows of piles driven from 3.5 to 4 ft. apart in the rows. The piles of the two outer rows are

Myler derrick operating a clam-shell bucket. It was there reloaded onto scows, of which there were two suitably arranged for the work. The usual load for a scow was 30 cu. yds. of gravel and 60 cu. yds. of sand. These scows were originally dump scows, but the bottom of the pockets was floored over and tightly caulked, converting them into deck scows. One pocket in each scow was covered over with a roof, forming a rude house or shed, which was used for the storage of cement. Each house has a capacity of about 1,000 bags of cement. The cement used was the Lehigh Portland made by the Lehigh Portland Cement Co. of Allentown, Pa.

#### PROPORTION OF MATERIAL, HANDLING OF BLOCKS, ETC.

The proportion of the materials used in making the concrete blocks was generally as follows: One part cement, one part small gravel and sand mixed, two parts sand grit (sand and fine gravel), four parts unscreened broken limestone. This was varied according to the amount of sand in the gravel, the grit and the broken stone. The aim was to get a proper amount of sand, ordinary sand and stone-crusher sand, from the three sources to make with the cement sufficient mortar to fill to excess the voids in the larger stone and gravel. No difficulty was experienced in this. The materials were deemed of most excellent quality and uniformity in each load. The writer knows that the use of unscreened broken stone, run-of-the-crusher, is not in general accord with past engineering practice, but he believes it is best practice, and that engineers have for years been discarding from their concrete aggregates the best and most valuable parts of the broken stone. The concrete was made quite wet, the water used for each batch ranging between 2 and 2.5 cu. ft. After the concrete was deposited in the forms it was spread out evenly. Especial care was taken to keep the finer material next to the faces. By working an ordinary spade up and down between the concrete and the forms and following this up by tamping with a narrow rammer, a very smooth-faced block was obtained.

To facilitate the handling of the blocks, each was provided with three iron bolts molded in the top face. These bolts had unequal legs, the longer 24 in. and the shorter 12 in. long. The longer leg had a square turn at the bottom about 4 in. long, while the turn of the shorter was about 2 in. The bolts were driven into the soft concrete on or about the completion of the block, care being taken to consolidate well the concrete around the bolts by thorough ramming. The blocks were transferred from the dock onto deck scows by means of a large floating derrick, the loaded scows being towed to the work which was located about one mile from the dock. For lifting the blocks, three lifting chains were used, each attached with one end to a common ring and supplied at the other end with a strong hook which engaged in the bolts before mentioned. Two



of the lifting chains were provided with turnbuckles for adjusting the proper length of the same, in order to make the blocks hang level. The ring of the swing chains was hung from a loaded hook attached to the blocks of the hoisting cable.

#### CONCRETE SUPERSTRUCTURE.

Much of the timber superstructure damaged by the gale of Nov. 21, 1900, was entirely swept down to the water's edge. On other portions the timber walls were left standing in various stages of demolition. Many of the interior cross and longitudinal ties were torn out and much of the stone filling washed out. The cribs had originally been sunk to a few tenths of a foot above water level. The different gales had caused a settlement of from 1 to 2 ft., with a probable average of 1.5 ft. These storms coupled with a heavy ice movement also produced a deviation in the alignment. The original line was almost perfect, and the greatest movement from it was 2 ft. towards the harbor and 1 ft. towards the lake side, a total variation of 3 ft. between extremes. The settlement of the cribs proved to be an advantage rather than otherwise, the tops of the same in many places closely approximating the required grade line of 2 ft. below mean lake level. After a section of timber superstructure had been wholly removed to the crib level, the tops of the cribs were prepared for the reception of the concrete blocks. Where the cribs were too high for the established grade, the timbers were trimmed down. When too low, they were shimmed up by planking thoroughly spiked to the underlying timber. Owing to the deformation of the lake and harbor faces of the original crib substructure by the various gales, it was not possible to preserve a straight alignment for the new concrete superstructure. An accurate survey of the position of the cribs was made from the plan of which the lines of the new structure were determined.

The concrete blocks were set in place by large floating derricks, expressly built for this work. No fixed procedure was followed in setting the blocks, the condition of the prepared foundation generally governing this. After sufficient blocks necessary for a complete section had been placed, the work of placing the mass concrete was commenced. The banquet sections were invariably constructed first. The concrete mixing plant is a floating one, an old dismantled schooner, the Tracy J. Bronson, built in 1857, being utilized for the installation of the mixer, engines, boilers and derricks. The same material, scows and canal boats were used as for the concrete blocks. In making the mass concrete the mixer boat was moored alongside the breakwater, always with the starboard side towards the same. The canal boat containing the broken stone was moored on the port side of the mixer boat, and the scow, containing cement, gravel and sand, on the outside of the canal boat (see Fig. 9). The details for handling the concrete ingredients and mixed concrete were similar to those employed on the concrete dock, with the only exception that two derricks instead of one were used, one derrick handling exclusively the cement, sand, gravel and broken stone, and the other the mixed concrete. The mixed concrete, after passing through the mixer, was deposited in a steel skip or box which rested on a small railway car, and which after being run from under the mixer was swung by the derrick onto the work and back again.

The proportions of the various materials composing the mass concrete were identical with those of the concrete blocks, except that they were mixed in larger quantities, these being exactly one-half greater. The quantities for one batch were as follows: 5.4 cu. ft. of cement, equal to six bags, or 1½ barrels; 5.4 cu. ft. of gravel, equal to two small wheelbarrow loads; 10.8 cu. ft. of sand grit, equal to three large wheelbarrow loads; 21.6 cu. ft. of unscreened broken stone, equal to one whole steel bucket; total 43.2 cu. ft.

The contractors were the Buffalo Dredging Co. of Buffalo. Owing to the great strike of machinists in the spring of 1901 the company was greatly delayed in getting its plant ready for the work. This and various other causes prevented the company from fully completing the work during the season of 1901, but all the cribs were covered and left in good condition for winter, and the work was finally completed on May 12, 1902.

#### SHIP YARD NOTES.

Work will shortly be started at the Perth Amboy Ship Building & Engine Co.'s works, Perth Amboy, N. J. It is reported that arrangements have been made with the Eastern Ship Building Co., New London, Conn., whereby the Perth Amboy company will take care of its overflow work.

In a few days the new vacuum dredge Patapsco, built by the Maryland Dredging & Contracting Co., Baltimore, will be ready for a test of her capacity. The hull, built by Thomas McCosker & Co., Baltimore, is 90 ft. long, 32 ft. wide and is constructed of the heaviest select timber.

At Bath, Me., last week the three-masted schooner Fairfield was launched from the yard of G. G. Deering. She was built for H. Weston & Co. of Jacksonville, Fla., and will be used in the lumber trade. Her dimensions are: Length, 159.8 ft.; breadth, 35.4 ft.; depth, 13 ft. 5 in.

The Weetamoo, a steamer built for the Woodsum Steamboat Co. by Sinn & Page of Baltimore, Md., was launched at Lake Sunapee Station, N. H., last week. The Weetamoo is of steel throughout, has a length of 55 ft. and a beam of 12 ft.

The Clyde line has decided to lengthen its two steamers, the Apache and Arapahoe, 60 ft. The business of the company is growing rapidly. Work is now being rushed on the new steamer for the company at Cramps, Philadelphia.

The Nilson Yacht Building Co., Baltimore, Md., will build a steam yacht of 125 ft. length for Mr. R. P. Hart of New York. Mr. Hart is a retired cattle raiser, well known in yachting circles.

Keel for a five-masted wooden schooner to be built at Camden, Me., for Capt. J. G. Crowley of Boston has been stretched and the work of putting up the frames will begin immediately.

The Townsend & Downey Ship Building & Repair Co., Shooter's Island, N. Y., will shortly add a new floating dry dock to its equipment.

It is understood that the Merchants & Miners' Transportation Co. of Baltimore is in the market for two new steamers.

Moran Bros. Co., Seattle, Wash., will do some repair work upon the transport Dix before she sails for Manila.

#### RETIREMENT OF BRIG. GEN. CHARLES BIRD.

Brig. Gen. Charles Bird, in charge of the transport service of the war department during the war with Spain, having reached the age of sixty-four years, has just been placed on the retired list. Gen. Bird's record is a notable one throughout and few officers have lived a more strenuous life. He was brevetted four times for gallant service during the civil war and went through the last part of it with a wound in the groin, which had passed through the entire body, still open. In 1895 he was transferred to duty in the office of the quartermaster general in this city, and placed in charge of the supply and transportation branch. On the breaking out of the Spanish war he was put in special charge of the division of water and rail transportation, during which time he organized and was directly in charge of the new branch of the quartermaster's department known as the transport service. As such he was responsible for the movement of troops by rail and by transports to our various island possessions.

The transport service consisted of twenty-six owned vessels, purchased from various parties, and 112 chartered transports. The troop transports, especially those owned by the government, were fitted up in the most improved manner for the comfort of the troops, the fittings including sleeping apartments, galleys, lavatory, bathing and water closet facilities, electric, ventilating and refrigerating plants. This transport service has become so complete that it is the pride of the army and a surprise to the principal nations of the world, many of them having sent representatives to examine the ships, and upon request they have been furnished with plans and specifications of the same. The transport service has carried to and from our island possessions about 358,000 officers and soldiers, 30,000 civilian employees, 58,000 animals, 255,000 tons of forage, hay and oats and 644,323 tons of freight and 4,739,870 packages and pieces of baggage. Of all the officers, soldiers and civilian employees carried the records show that not one has been injured on account of navigation or owing to faulty construction of the fittings of the ships. In addition to handling troops by water Gen. Bird has been in charge of the railroad division of the quartermaster's department, which moved during and since the Spanish war about 788,000 officers and men, 141,000 animals, and 1,400,000 tons of supplies.

Officials of the Lake Shore Engine Works, Marquette, Mich., have just been advised by the secretary of the South Carolina Inter-State and West Indian Exposition that they have been given a certificate of award and gold medal for the "Superior" gasoline engine. This award was given to the Lake Shore company on the simplicity of construction, the sureness of action of the engine, the perfection of build, and the large horse power developed in small space, and for minimum weight. The Lake Shore also received a very complimentary testimonial from the board of award, speaking of the general excellence and merits of the engine. This award was granted in competition with a dozen or more of the most prominent makes of engines manufactured in the east and west, both four-cycle and two-cycle.



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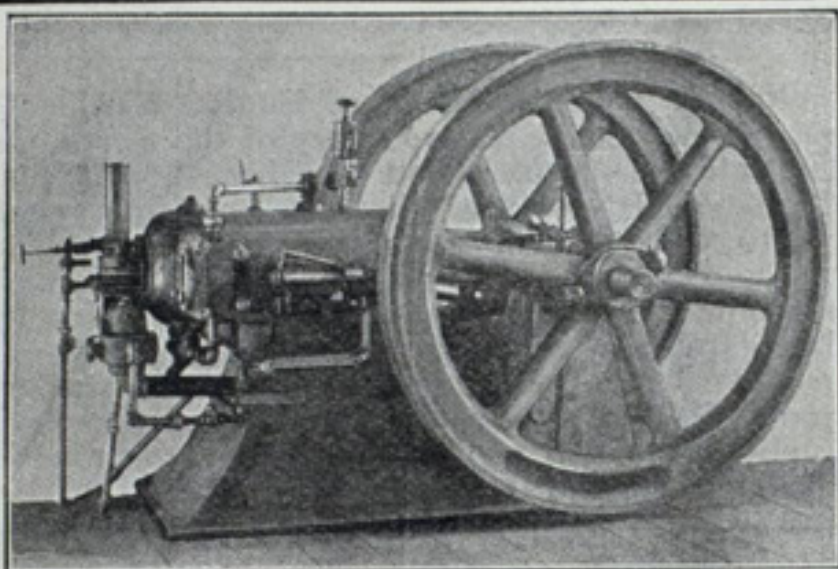
The Continental Iron Works of Brooklyn, N. Y., well known in ship building circles on account of the special type of furnace which they make, have recently purchased from the Westinghouse Electric & Mfg. Co. considerable additions to their electrical equipment. The purchase includes a 180-K. W., 220-volt, 60-cycle, two-phase alternator, a five-panel switchboard, eleven induction motors of from 5 to 20 H.P. each, with the accompanying auto-starters. The company some time ago installed alternators of 120 K.W., and 45 K.W. each, and of the same characteristics as the above. They also have quite a number of induction motors in use driving corrugating and bending rolls for making Morison fire-boxes, also driving fans, shears, tools in the machine shop, etc. Some of the motors which have recently been purchased are to displace direct-current motors, the original installation at this particular plant having been of direct-current apparatus. Afterwards a 45 K.W. alternator was put in to try alternating current distribution and subsequently the 120 K.W. and 180 K.W. alternators have been purchased. The direct-current motors are rapidly being replaced by alternating-current induction motors, and this is after a thorough and careful investigation of the subject and several years' trial of the induction motors. In fact, when the new 180 K.W. alternator is installed, the old direct-current generator will be used as an exciter, also furnishing current to one or two small direct-current motors which will be used for a while until they are worn out.

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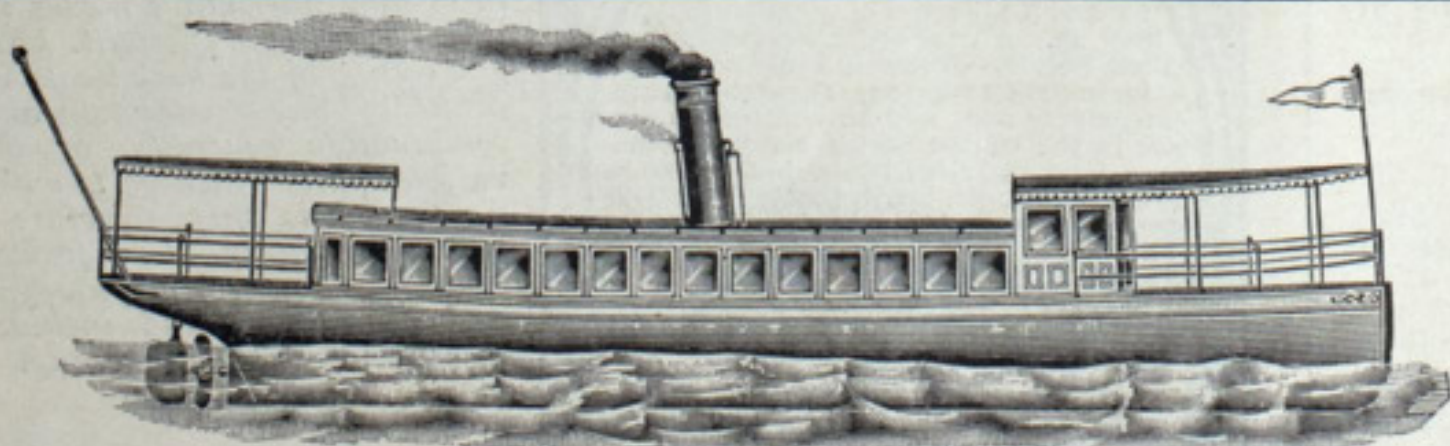
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Every ship builder, marine engine and boiler builder, ship owner, naval architect, marine engineer, and, in fact, everyone whose business is with ships is mentioned in the Blue Book and his address given. The aim has been to make it a complete working directory of the marine trade of the United States. With its aid you may reach anyone connected with this great branch of industry.

Its statistics of waterborne commerce are thoroughly reliable. The section devoted to the commerce of the great lakes with its iron mines and their output, its coal trade and dock facilities, its grain trade and elevators, its ships and their owners, is very thorough and absolutely authentic.

The rear pages of the Blue Book are devoted to a **BUYERS' DIRECTORY** of the **MARINE TRADE**—that is a list of manufacturers of ship yard equipment and ship supplies, arranged under the titles of the articles which they make, for the benefit of the buyer, who is usually the ship builder or ship owner. By ordering a copy of the Blue Book in advance your name will be inserted in the Buyers' Directory under various headings suited to your business without extra charge. The price of the Blue Book is \$5.

If you decide to advertise your output in the Blue Book your name will, of course, be inserted under the various headings of your business and you will receive a copy of the book free. The advertising rates are extremely low—full pages \$75 and \$100, and half pages \$40 and \$55, according to location.

The Blue Book enjoys an extended patronage throughout the United States and Canada and a considerable favor in Great Britain and Europe. We, therefore, commend it as a medium where-with to reach the foreign field.

The Blue Book is now in preparation for the press and will be published within three weeks. If you would like to know more about it, a postal card will fetch a little booklet.

MARINE REVIEW PUBLISHING CO.  
39-40-41 Wade Bldg., Cleveland, Ohio



TRADE NOTES.

Thos. Drein & Son, boat builders of Wilmington, Del., have moved their works from Tatnall and Railroad streets to Tatnall street below Railroad, having sold the old property to the Pennsylvania Railroad Co. At the new shops work is being rushed on an unusually large number of orders for life boats that are to be supplied to big ships under construction in different parts of the country.

The C. W. Hunt Co., West New Brighton, Staten Island, New York, has just issued a little mailing card devoted to its storage battery electric locomotives. They are represented to be the ideal power for handling cars in manufacturing establishments and for switching ordinary railway cars in and about mills and works. The company builds two styles—one for narrow gauge and one for standard gauge.

Fifteen branch offices are now maintained by the Crane Co. of Chicago. The newest offices are: Crane Co., Seattle, S. B. Peeples, manager; Crane Co., Salt Lake City, Wm. Bowen, manager; Crane & Ordway Co., Duluth, C. A. Payne, manager. A full line of plumbing goods in addition to Crane specialties is carried at these offices. Cities in which branches are located are New York, Philadelphia, Cincinnati, St. Louis, St. Paul, Minneapolis, Duluth, Omaha, Sioux City, Kansas City, Los Angeles, San Francisco, Salt Lake City, Portland, Ore.

It is understood that directors of the Chicago Pneumatic Tool Co. have decided to exercise the option which they hold upon the plant of the International Pneumatic Tool Co. of London and that \$200,000 of treasury stock will be issued in connection with the absorption of the company. It is said that the acquisition of this company will give the Chicago Pneumatic Tool Co. complete control of the situation abroad. The executive committee of the Chicago Pneumatic Tool Co. is now composed of Charles M. Schwab, Max Pam, C. H. Matthiessen, John R. McGinley and J. W. Duntley.

The Smooth-On Manufacturing Co., Jersey City, has moved into new quarters. The offices are now at 547 and 549 Communipaw avenue and the works are at 53 and 55 Harrison avenue. In its new laboratories the company has the best apparatus for general chemical analysis. A new treatise on the subject has just been issued by the company. It shows deep knowledge, and the style is plain and simple. Another book describes the "Smooth-On" iron compounds, "Smooth-On" paint and "Smooth-On" cements for iron, steel and brass. Both these publications are free for the asking.

J. S. Jackson & Son of Bath, Me., well-known throughout the country and especially in New England as manufacturers of tackle blocks, have just moved into a large new factory. Fire some time ago destroyed their entire plant. They began work immediately on a new structure, modern in all details, built of brick, and three stories high. In a circular just issued they say: We are pleased to inform our patrons that our new three-story brick factory is completed and that we are now installed in the

finest plant in the world for the manufacture of tackle blocks. Nothing known to the craft has been omitted in its equipment and if our product in the past has been good, our future efforts will be to improve upon it. Our aim and specialty will be high-class work and we shall endeavor to produce a block which will be a credit to ourselves and of the highest value to our customers.

The Engel & Fagersten Chemical Co., 1072 Wabash avenue, Chicago, has perfected an automatic positive feed pump which is attached to the boiler feed pump and regulated by the stroke of the latter. By means of this pump the boiler compound is fed regularly and continuously in any desired quantity from a drop per minute to a quart an hour, and thus the amount of the compound is proportioned to the feed and supplied at the proper time. This company is the manufacturer of the "Neptune" anti-fouling compound and the pumps for feeding are furnished to customers with every trial order for the compound.

Salt Water Steam Yacht for Sale.

75 ft. long, 9 ft. beam and 4 ft. 6 in. draught. Speed 15 miles per hour all day long. Five double berths, besides crew's quarters. Roberts boiler compound engine. Cabin finished in oak and cherry. Complete inventory. Address P. O. Box 192, Detroit, Mich. July 17.

Sealed proposals will be received at the office of the Light-House Board, Washington, D. C., until 2 o'clock p. m., July 10, 1902, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the twin screw steel steam light-house tender Crocus for a fixed sum for said vessel delivered either at the Buoy Depot, Buffalo, N. Y., or at the Light-House Depot, Tompkinsville, N. Y., as will be determined upon by the Light-House Board. Proposals, plans and specifications can be had by applying to the Light-House Board, Washington, D. C., or at the office of the Light-House Inspector, Buffalo, N. Y. George C. Remey, Rear-Admiral, U. S. N., Chairman. June 26.

Position as Manager.

Position as manager, superintendent or designer with yacht or launch building concern, wanted by naval architect who has had over twenty years' experience in designing and building yachts and other vessels, steam and gas engines, etc. Fully up to date in modern office systems and labor-saving methods. Has now a position with one of the largest ship yards in America, but would prefer to work for a smaller company. Address, "Industrious," the Marine Review Pub. Co., Wade building, Cleveland. June 26.

BELLEVILLE GENERATORS

Grand Prix 1889  
Originated 1849

Hors Concours 1900  
Latest Patents 1902

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895.....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900.....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901.....	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total.....	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.  
WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.  
TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.